



सत्यमेव जयते

भारत सरकार Government of India  
रेल मंत्रालय Ministry of Railways

**REPORT**  
**OF**  
**THE RAILWAY REFORMS COMMITTEE**

**Part I**

**APRIL, 1982**



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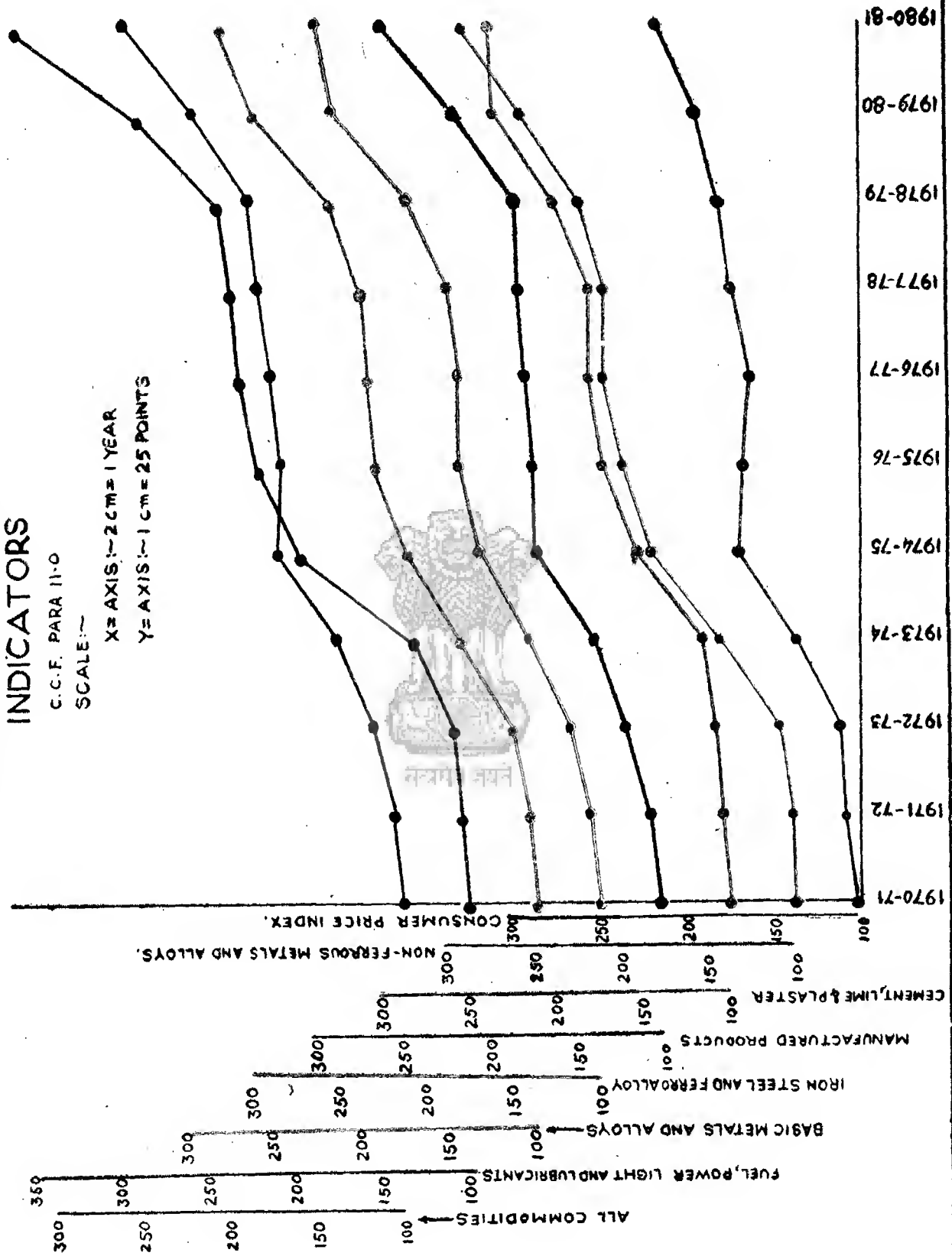


# SELECTED ECONOMIC INDICATORS

C.C.F. PARA 11-0  
SCALE:-

X = AXIS:- 2 CM = 1 YEAR

Y = AXIS:- 1 CM = 25 POINTS





## INTRODUCTION

The Government of India appointed the Railway Reforms Committee, to examine and report on various aspects of railway working, vide their Resolution No. ERB-I/81/21/41 of May 12, 1981. The composition of the Committee was as under :

*Chairman :* Shri B.D. Pande

- Members :*
1. Prof. Ravi J. Matthai, Indian Institute of Management, Ahmedabad.
  2. Shri Russi Mody, Vice-Chairman & Managing Director, TISCO.
  3. Justice H.C.P. Tripathi, Former Judge, Allahabad High Court.
  4. Dr. Manmohan Singh, Member Planning Commission.
  5. Shri M.S. Gujral, Chairman, Railway Board.

*Secretary :* Dr. S.K. Ray, an IRTS Officer of Indian Railways.

1.1. Under Government Notification No. ERB-I/81/21/41, dated December 5, 1981, Shri V.P. Sawhney, Former Member, Staff, Railway Board, also joined the Committee as a Member, Shri M.S. Gujral has since resigned.

1.2. Shri B.D. Pande, took over as Governor of West Bengal on September 12, 1981. On his resignation in March 1982, Shri H.C. Sarin was appointed as Chairman of the Committee, vide Government Resolution No. ERB-I/81/21/41, dated March 9, 1982. Shri Sarin took over as Chairman on March 11, 1982.

2. The last comprehensive review of the working of the Indian Railways was made by the Indian Railways Enquiry Committee, 1947, under the chairmanship of Pt. H.N. Kunzru. During the next three and a half decades no other comprehensive review of the system was undertaken. Understandably, therefore, the terms of reference remitted to the Railway Reforms Committee 1981, are very wide and pervasive.

3. The Committee have been considering the different aspects of issues, problems, and perspectives relevant to the Indian Railways. For this the Committee considered it necessary to adopt a multi-pronged procedure. Eighteen working groups were set up consisting of specialists from within and outside the Government, and six consultancy studies were commissioned. Some discussions have also been held with Railway officers, trade unions, users, consultative committees, chambers of commerce and industry etc. Discussions have also been held with some of the former Chairmen of the Railway Board and a former Union Railway Minister. Similarly, discussions have been held with the different Directorates of the Railway Board. In the eleven months during which the Committee have been functioning, it was not possible to complete their visits and discussions and these, therefore, would have to be continued in the coming months.

4. The Committee consider that there are a few basic and vital issues which need urgent consideration and in this background, the Committee have applied themselves to the immediate task of concentrating attention on two major areas where immediate action is both necessary and possible. These are :

1. the all-important issue of raising additional resources to enable the Railways to catch up with the frightening arrears in renewal and rehabilitation of the permanent way and the rolling stock,
2. accidents and safety, which has been exercising the minds of the people and the Government alike.

5. In making their recommendations on matters relating to safety, the Committee considered it appropriate to review the Reports of the major Railway Accident Enquiry Committees during the last two decades, viz. the Kunzru Committee (1963), the Wanchoo Committee (1968), and the Sikri Committee (1978).

6. It is the considered view of this Committee that if serious and immediate action is taken on the basis of the recommendations made by them in this Report, even though it is in limited areas, it would help in bridging certain inadequacies and improving confidence in our Railway system.



## CHAPTER I

### RESOURCES FOR RENEWAL AND REPLACEMENT

#### 1.0. Introduction.

1.1. The productivity of a network system like that of Indian Railways depends, to a large measure, on the extent to which its assets are maintained in good fettle. The timely renewal and replacement of the permanent way, rolling stock etc. is a vital determinant of its productivity. In this context, therefore, the level of inputs and their utilisation under the five year plans towards renewals and replacements of the permanent way and the motive fleet assume great importance. It is proposed in this chapter to deal with only the problem of replacement and renewal.

1.2. It so happens that the investments on replacements and renewals have been increasingly inadequate from the latter half of the sixties. This was mainly due to appropriations to, and withdrawals from, the Depreciation Reserve Fund (DRF) having not kept pace with the large increases in the prices of track material and rolling stock which has taken place since the end of the Third Plan (1961-66). The cost of complete track renewal of 1 Km. during the Third Plan was only about Rs. 1.5 lakhs. This cost has been steadily going up and is now about Rs. 10 lakhs, but the contributions to the DRF changed from Rs. 100 crores in the year 1966-67 to only Rs. 145 crores in the year 1978-79. The withdrawals from the DRF also did not increase significantly, the increase being from Rs. 79.6 crores in the year 1966-67 to Rs. 136.2 crores in the year 1978-79. It is only during the Sixth Plan that the Railways have started providing significantly larger contributions to the DRF but even these are inadequate to cover the arrears. We also note that Railways were not supplied indigenous rails to the extent required and had to import part of their requirements. Imported rails were much costlier as a result of which, with the money available, the Railways could carry out a lesser quantum of track renewal. All this has led to accumulation of over-aged assets. The existence of such worn-out assets\* which have outlived their economic life imposes a drag on the rest of the system and upsets its operational efficiency.

1.3. Unless the pace of renewals is stepped up, over 20% of the entire rail track in the country will be sick by the end of the Sixth Plan. This indeed will be a very disquieting position. The Railways and the Government will be well advised not to accept this situation.

1.4. It will be nearly impossible for the Railways to keep the condition of their assets, the permanent way in particular, at a satisfactory level, if accelerated action, duly supported by provision of adequate funds, is not taken urgently for liquidating the arrears. In the deve-

loping economy of the country the Railways have to play a vital role as the biggest system of mass transit of passengers and freight. The stepping up of their capacity-utilisation during 1981-82 has been the most vital factor in the improvement of the power sector, production in steel, cement, fertiliser, and other constituents of the economy, as well as the public distribution system. It should be appreciated that the capital assets have been flogged by the Railway, and if their maintenance, renewal and replacement is not properly looked after, we may find it increasingly impossible to do so later. We may in fact find it difficult to maintain the present levels, what to say of facing ever increasing loads. Any complacent approach on this will be fraught with serious consequences, not only for the Railways but also for the economy as a whole. How serious the situation is will be evident from what is stated in the succeeding paragraphs.

#### 2.0. Arrears in track renewal.

2.1. The arrears in track renewal, as mentioned above, started building up after the Third Five Year Plan :

Plan period	Arrears in Kms.	
	Primary Renewal	Secondary Renewal
End of Third Five Year Plan (As on 31-3-66).	Nil	Nil
End of Fourth Five Year Plan (As on 31-3-74).	2,400	1,500
As on 31-3-80	7,780	5,260
As on 31-3-81	9,200	5,940
As on 31-3-82	10,300	6,540

2.2 If the outlay on track renewals is not enhanced from the already approved amount of Rs. 500 crores (net) for the Sixth Five Year Plan, the arrears at the end of this Plan will be 21,040 Kms. as per the position given below :

(In Kms.)				
Type of renewal	Arrears as on 1-4-80	Arisings during the Sixth Plan	Expected renewals with net out lay of Rs. 500 crores already approved by Planning Commission	Balance by the end of the Sixth Plan (2) + (3) - (4)
1	2	3	4	5
Primary	7,780	11,500	5,700	13,580
Secondary	5,260	4,500	2,300	7,460
Total	13,040	16,000	8,000	21,040

\* Coddalife :

#### (i) Rail.—

Life of rail is a function of axle load, rail section, type of rail steel and the traffic density. For instance, in our conditions, 52 kg. medium manganese rail requires renewal after 350 gross million tonnes of traffic has passed over it.

#### (ii) Rolling Stock.—

(a) Locomotives	...	...	40 years.
(b) Wagon	...	...	35 years.
(c) Coach (Steel bodied)	...	...	25 years.
(d) Coach (Wooden bodied)	...	...	30 years.



2.3. Because of overaged track getting enhanced year by year the length under speed-restriction has been increasing, adversely affecting the throughput. The rail fractures due to overaged rails, poor condition of sleepers, fittings, etc. are also steadily on the increase. Besides being safety hazards, rail fractures upset the train operations and result in decrease in revenue (due to speed restraints), thus creating a vicious circle. The position in this regard is as under :

#### Length of track under speed-restrictions

March, 1968	...	780 kms.
February, 1982	...	2035 kms.

#### No. of rail fractures

1968-69	...	471
1980-81	...	4517
1981-82	...	4486
(upto February 1982)		

#### 3.0. Arrears in replacement of rolling stock.

##### 3.1. Locomotives.

3.1.1. Over the years, the Railways have been able to condemn a number of overaged steam locomotives by replacing them with new diesel locomotives. As against 1920 BG and 765 MG overaged locos at the end of the First Five Year Plan (1951-56), the number of such overaged locomotives were 248 and 280 respectively in the beginning of the Sixth Five Year Plan (as on 1-4-80). The position of replacement of locomotives is, therefore, not very unsatisfactory, even though the pace needs to be accelerated.

##### 3.2. Coaching stock.

3.2.1. The number of coaches overdue for replacement from time to time have been as under :

Plan period	No. of coaches overaged	
	Broad Gauge	Metre Gauge
End of First Plan 31-3-56	3,817	3,210
End of Second Plan 31-3-61	5,218	3,428
End of Third Plan 31-3-66	4,434	2,737
End of Fourth Plan 31-3-74	2,273	1,900
As on 31-3-80	1,559	1,109

The position during the Sixth Five Year Plan is as under :

	Number overdue replacement at the beginning of Sixth Plan (31-3-1980)	Falling due during Sixth Plan (1980-85)	Total number to be replaced	Already replaced			Yet to be replaced
				1980-1981	1981-1982	Total	
BG	1,559	2,790	4,349	404	530	934	3,415
MG	1,109	1,704	2,813	223	370	593	2,220
Total	2,668	4,494	7,162	627	900	1,527	5,635

\* A beginning, though delayed, has been made in stepping up the replacement of overaged machinery and plant. The plan to modernise the Workshops should not be unduly extended,

##### 3.3. Wagons.

3.3.1. The extent of overaged wagons (in terms of vehicle units) is given below :

Plan period	No. of wagons overaged	
	Broad Gauge	Metre Gauge
End of First Plan 31-3-56	30,354	14,270
End of Second Plan 31-3-61	22,187	10,649
End of Third Plan 31-3-66	25,879	13,669
End of Fourth Plan 31-3-74	12,054	10,464
As on 31-3-80	20,245	10,109

The number of wagons (in terms of four-wheelers) overdue replacement at the beginning and at the end of the Sixth Five Year Plan, are as under :

	Number overdue replacement at the beginning of Sixth Plan (31-3-1980)	Falling due during Sixth Plan (1980-85)	Total number to be replaced	Already replaced			Yet to be replaced
				1980-1981	1981-1982	Total	
BG	21,208 (20,245)	26,719 (26,169)	47,927 (46,414)	8,772	13,800	22,572	25,355
MG	12,382 (10,109)	1,131 (861)	13,513 (10,970)	2,700	4,000	6,700	6,813
Total	33,590	27,850	61,440	11,472	17,800	29,272	32,168

(Figures in brackets indicate wagons in terms of vehicle units).

It will thus be observed that as many as 32,168 wagons (in terms of four-wheelers) have to be replaced during the remaining three years of the Sixth Five Year Plan, if the arrears have to be overtaken.

##### 3.4. Machinery and Plants.

3.4.1. About 30,000 items of machinery and plant are used on the Indian Railways for maintenance and manufacture of rolling stock and other assets. In the Workshops the percentage of overaged machinery and plant is more than 75 percent and in production units more than 50 percent. These arrears have got built up to such large proportions because of meagre funds used for machinery and plant.

3.4.2. The utilisation of funds for renewals of machinery and plant has broadly been as follows :

Plan period	Expenditure incurred (Rs./crores)
First	14.06
Second	17.00
Third	11.01
Fourth	21.46
Fifth (four year)	42.00

3.4.3. It is only in the Sixth Plan that allotment of funds for machinery and plant has been stepped up. In the budget for the year 1982-83 an amount of Rs. 43.5 crores has been provided under the DRF and another Rs. 24 crores under Capital i.e., in all Rs. 67.5 crores have been provided.\*

modernisation being vital to improve the performance and availability of rolling stock. The Committee will go into this aspect in depth in a subsequent report.



#### 4.0. Availability of track material.

##### 4.1. Rails.

4.1.1. The requirements of rails are met by the Bhilai and TISCO Steel Plants. Whereas Bhilai supplies 60 kg., 52 kg., and 90 lb rails; 75 lb rails are supplied by the TISCO steel plant. Even though Bhilai has a rolling capacity of 5 lakh tonnes of rails per annum, the actual supplies in the last few years have been varying from 1.37 to 1.95 lakh tonnes, but the commitment for the year 1982-83 is 2.5 lakh tonnes. We are also told that TISCO is likely to shut down its rail rerolling mill on the ground of this mill being old and obsolete. Because the Railways have not been able to get their full supplies of rail indigenously, they have had to resort to imports.

##### 5.0. Sleepers.

5.1. About 8 lakh concrete sleepers are likely to be available in 1982-83. In addition, 3 lakh steel sleepers are expected to be supplied by the Durgapur Steel Plant, though the capacity of this plant is 10 lakh sleepers. The expected availability of wooden sleepers is about 28 lakhs. Regarding cast iron sleepers, their availability depends upon the supply of pig iron. The present allotment of pig iron to the Railways by SAIL is about 1,15,000 tonnes in the full year, which would be only enough to manufacture about 15 lakh sleepers.

5.2. In all 54 lakh sleepers are likely to be available for all purposes during 1982-83, as indicated below :

Category	Numbers
Concrete	8 lakhs
Steel	3 lakhs
Wooden	28 lakhs
Cast Iron	15 lakhs
Total	54 lakhs

#### 6.0. Available Production capacity of coaches and wagons.

##### 6.1. Coaches.

6.1.1. The production of coaches including Electrical Multiple Units is expected to be as under :

##### Production Capacity of Coaches and EMUs

(In numbers)

	1982-83	1983-84	1984-85
Integral Coach Factory	750	750	750
BEML	400	475	550
JESSOPS*	350	375	400
	1,500	1,600	1,700

The number of Electrical Multiple Units to be produced in the next three years is 378.

6.1.2. The total number of coaches, other than EMUs, that can be produced in the remaining three years of the Sixth Five Year Plan will be 4,422 against the replacement requirement of 5,635. The entire production

of 4,422 coaches should, therefore, be taken on replacement account. There is little merit in persevering with coaches which are unfit for use, or to what the demand for more trains by having production on additional account, when much of the existing fleet is ineffective and useless.

##### 6.2. Wagons.

6.2.1. The production capacity available in the country for manufacture of wagons is as follows :

(In four wheelers)

Bharat Wagon/Muzzafarpur	..	1,100
Bharat Wagon/Mokameh	..	1,600
Braithwaite	..	3,000
Burn Standard/Howrah	..	4,800
Burn Standard/Burnpur	..	4,000
CIMMCO	..	2,500
HGI/Nangloi	..	1,250
Modern Industries/Ghaziabad	..	2,250
TEXMACO	..	3,850
Railway Workshops	..	2,000
		26,350

6.2.2. Arrangements for procurement of components, of which some may require partial import, will have to be tied up well in time, in respect of the recommended programme, so that no item would become a critical factor.

#### 7.0. Chasing of liquidation of arrears of renewal and replacement.

7.1. In any programme for catching up with the arrears in track renewal, two constraints that we have to attack in devising a realistic programme of action are principally inadequacy of funds and permanent way materials.

7.2. For bringing the desired operational efficiency it is essential that the arrears in track renewal are wiped out as early as possible and on the highest priority. For the last couple of years, the level of primary track renewal has hovered around 1,000 kms. per year. The Railways were able to do 2,600 kms. of primary renewal per year during the Third Five Year Plan. With the availability of adequate funds and the permanent way materials, it should be possible to carry out annually an average of 3,300 kms. of primary renewals and 1,500 kms. of secondary renewals in the remaining three years of the Sixth Five Year Plan. This level of renewal would require about 3.3 lakh tonnes of rails of various sections, including 30,000 tonnes of rails of 75 lb section for M.G.† and as regards sleepers, 60 lakhs of various categories. As against this requirement, Bhilai has a capacity to produce 5 lakh tonnes of rails of various sections (excluding the 75 lb section for the M.G.). The annual requirement of 75 lb rails is only 30,000 tonnes, which TISCO should continue to supply until the Government has decided upon and developed an alternative indigenous capacity.

\* This assumes that Jessops will be required to perform up to its rated capacity unlike in the past few years.

† About 80,000 tonnes of rails will be required for new lines, conversions, etc.



7.3. In the overall interest of security and the development of transport infrastructure (with our restraint of funds), the capacity must exist within the country : for a vital item like the rails, the country can ill-afford to depend on external sources of supply. Moreover, the imports, besides being costlier, have a long lead time and result in a mix of rails by different manufacturing agencies, and in an emergency would be an undependable source.

7.4. Since the requirement of sleepers (60 lakh annually\* is more than the availability during 1982-83 viz., 54 lakhs, the Committee recommend that the Railways should take urgent action for increasing indigenous capacity of manufacture of concrete sleepers. At the same time the Government should prevail upon Durgapur Steel Plant to manufacture steel sleepers at their full capacity, and also permit the Railways to import pig iron for manufacture of additional cast iron sleepers if it cannot be made available indigenously. We would, however, like to stress that we are not recommending use of cast iron sleepers on trunk routes and main lines.

7.5. We recommend that main routes formed by the 'quadrilateral' and the 'diagonals' connecting Delhi, Bombay, Madras and Calcutta and the heavy mineral routes should be given high priority.

7.6. Regarding wagons, the Railways should reasonably be in a position to become up-to-date by the end of 1983-84. As for coaches, the entire available production capacity, as already stated, should be used for replacements. This would still leave a balance of about 1200 coaches by the end of Sixth Five Year Plan.

7.7. A quick look by the Committee shows that there is hardly any scope of further expansion of the existing manufacturing capacity of coaches. In order, therefore, to catch up with the arrears and to provide for additional coaches to cater to the growing passenger traffic, it is essential to set up an additional coach factory in the country. It is understood that the Planning Commission have already cleared this proposal in principle. We would only recommend that the decision as well as setting up of the factory should be speeded up.

## 8.0. Funds needed.

8.1. While the Ministry of Railways have stepped up the level of contribution to the Depreciation Reserve Fund from Rs. 220 crores in 1980-81 to Rs. 500 crores in 1982-83, even the amount of Rs. 500 crores is not sufficient and needs to be stepped up.

8.1.2. In the Budget estimate for 1982-83, an amount of Rs. 568 crores (gross) has been provided under Depreciation Reserve Fund. The renewal of track and replacement of rolling stock and machinery and plant account for bulk of this amount :

Category	Budget provision for 1982-83 for replacement and renewal (In crores of Rs.)
Track renewal	160.5
Locos	70.8
Carriages	68.0
Wagons	183.6
Machinery and Plant	43.5
Total	526.4

The remaining amount is on works like bridges, workshops, staff quarters etc.

8.1.3. Rs. 160.5 crores provided under track renewal will cover about half of the current annual arisings of 2,300 kms. of primary renewal and 900 kms. of secondary renewals. For wiping out the backlog of arrears even in 10 years, the Railways will have to undertake 3,300 kms. of primary renewal and 1,500 kms. of secondary renewal every year, beginning from 1982-83. Funds required for this level of renewal at current prices may be roughly :

	Rs.
(a) 3,300 kms. of primary renewal	330.0 crores
(b) 1,500 kms. of secondary renewal	75.0 crores
(c) For points and crossings renewal etc.	25.0 crores
Total	430.0 crores (1)
Less funds already provided	160.5 crores (2)
Balance required (1)–(2)	269.5 crores

Thus an additional amount of about Rs. 269.5 crores will have to be provided for track renewals for 1982-83. For the remaining two years of the Sixth Five Year Plan, an amount of Rs. 430 crores (gross) (to be suitably adjusted for price escalation) will have to be provided for track renewal alone.

8.1.4. The cost of replacement of 16,000 wagons is estimated as Rs. 256.0 crores, as against which the amount provided in the budget for 1982-83 is Rs. 183.6 crores i.e., Rs. 72.4 crores short of the requirement. In the year 1983-84 also the provision attributable to wagons to be made under DRF would have to be Rs. 256.0 crores (gross) (to be suitably adjusted for price escalation).

8.1.5. As for coaches, 1,350 coaches can be replaced in the year 1982-83, 1,485 in 1983-84 and 1,585 in 1984-85. Funds needed for this during 1982-83 would be Rs. 105.3 crores.† As the provision made in 1982-83 is Rs. 68.0 crores, and additional outlay of Rs. 37.3 crores would be required. In subsequent years of the Sixth Five Year Plan, for this programme the provision to be made in the Budget should be Rs. 115.8 crores (gross) for 1983-84 and Rs. 123.6 crores (gross) for 1984-85 (to be suitably adjusted for price increases).

8.1.6. Due to financial restraints, no additional amount is or the present recommended for locomotives and machinery and plant.

8.1.7. The position thus emerges as under :

(In crores of Rs.)

Category	Funds provided in the budget for 1982-83	Funds required in 1982-83	Difference
Track renewal	160.5	430.0	269.5
Locomotives	70.8	70.8	..
Carriages	68.0	105.3	37.3
Wagons	183.6	256.0	72.4
Machinery and Plant	43.5	43.5	..
Total	526.4	905.6	379.2

\* In addition, 12 lakh sleepers are required for new lines, conversions etc.

† Cost of a coach has been taken as Rs. 7.8 lakh on the presumption of a certain mix of types, viz., Chair Car, sleepers etc.



8.1.8. Taking credit for released materials at about Rs. 70 crores, the additional requirement of funds during 1982-83 will be Rs. 309 crores (net).

8.1.9. The funds (gross) required for the years 1983-84 and 1984-85 will be as under :

(In crores of Rs.)

Category	Funds (gross) to be provided in the budget for the year	
	1983-84	1984-85
Track renewal	430.0	430.0
Carriages	115.8	123.6 (a)
Wagons	256.0	.. (b)
	801.8*	543.6*

\* (to be adjusted for price escalation).

(a) By the end of Sixth Five Year Plan, overaged 1,215 coaches will still be left.

(b) Arrears will be overtaken by 1983-84 and hence no provision made for 1984-85.

8.1.10. We recommend that the tempo should be built up in 1982-83 itself and the Railways achieve the targetted renewals and replacements. The Committee also consider that the balance of funds under DRF be carried forward and used for achieving the targets recommended by the Committee.

## 9.0 Approval of Railway Convention Committee.

9.1. The stepping up of the contribution to the DRF will require the approval of the Railway Convention Committee. The Ministry of Railways may, therefore, approach the Convention Committee immediately for stepping up the contribution to the DRF Rs. 500 crores to Rs. 809 crores for the year 1982-83. For subsequent years of the Sixth Plan also, the funds assessed by us in para 8.1.9 should be taken note of while approaching the R.C.C. Simultaneously, the Planning Commission would have to consider seriously about increasing the Plan outlay.

## 10.0 A postscript on funds.

10.1. In chapter II the Committee have made a number of recommendations which should improve the Railways performance on safety and accident-prevention. The requirement of funds in the present chapter deals exclusively with renewal and replacement of track and rolling stock, and does not cover funds needed to implement the Committee's recommendations on safety.

10.2. As regards safety, no compromise should be made, and provision has to be made for the requisite funds.

10.3. Over and above the additional funds required for replacement and renewal, the Ministry of Railways should make a careful assessment of the outlay required under various plan heads for developing capacity to meet the targetted level of originating traffic and approach Planning Commission for increasing the Plan outlay, in time for the mid-term appraisal of the Sixth Plan. It is not possible to quantify the additional earnings that will accrue as a result of the accelerated

renewal and replacement. The expenditure on such replacement and renewal will undoubtedly infuse a new health into the system and save it from ultimate collapse and becoming a hard-to-recover liability on the General Exchequer.

10.4. The Government should not consider the need for additional requirement of funds as an exercise of distribution of overall resources, but should find ways and means for accelerating the development of the rail infrastructure which is found to be essential and inescapable for meeting the increased demands of the economy.

## 11.0 Conclusion.

11.1. The Committee would once again emphasise the seriousness of the situation in relation to the arrear of renewal and replacement that has been building up. The productivity of the system as a whole will suffer very badly unless timely action is taken. There is a limit beyond which the assets should be not allowed to wear out.

11.2. The issues are real, and are linked not only with the productivity of the system, but also safety of operation, as much as they are equally relevant to the needs of a developing economy.

## 12.0 Summary of recommendations and observations.

12.1. The investment on replacement and renewal have been increasingly inadequate since the late 1960s. The capital assets of the Railways are getting run down from year to year and unless the pace of renewals is stepped up, over 20 per cent of the entire rail track in the country will be sick by the end of the Sixth Five Year Plan. This indeed would be a very disquieting position. (Paras 1.3, 1.4 and 2.2)

12.2. While the position in respect of replacement of locomotives is not very unsatisfactory, 5,635 overaged coaches and 32,168 overaged wagons have to be replaced in the remaining three years of the Sixth Five Year Plan if the backlog of arrears is to be liquidated. (Paras 3.1, 3.2.1 and 3.3.1)

12.3. The arrears in track renewal have to be taken up on the highest priority. The Railways were able to do 2,600 kms. of primary renewal per year during the Third Five Year Plan. With the availability of funds and the permanent way materials, it should be possible to carry out an average 3,300 kms. of primary renewals and 1,500 of secondary renewals annually in the remaining three years of the Sixth Five Year Plan. (Para 7.2)

12.4. Bhilai Steel Plant has an annual capacity of 5 lakh tonnes of rails of 60 kgs. 52 kgs. and 90 lb. sections. They have, however, been supplying less than 2 lakh tonnes. Imported rails are much costlier and if the Railways are to import rails the funds required for track renewals will go up. Bhilai Steel Plant should produce rails to the extent required by the Railways. Regarding supply of 75 lb. rails for M.G., TISCO should be prevailed upon to continue to supply 75 lb. rails until a suitable indigenous source is decided by the Government and developed. (Para 7.2)

12.5. The Ministry of Railways should immediately take steps to augment the capacity for the manufacture of concrete sleepers and also prevail upon Durgapur Steel Plant to manufacture sleepers at their full capacity. The Railways may also be permitted to import pig iron (if not available indigenously) for manufacture of additional cast iron sleepers. The Committee, however,



do not recommend use of cast iron sleepers on trunk routes and Main lines. (Para 7.4)

12.6. The mian routes formed by the 'quadrilateral' and the 'diagonals' connecting Delhi, Bombay, Madras and Calcutta and the heavy material routes should be given priority. (Para 7.5)

12.7. All the overaged wagons should be replaced by the end of 1983-84. (Para 7.6)

12.8. The entire available production capacity (barring that for manufacture of Electrical Multiple Units) should be used for replacement of overaged coaching stock. This would still leave a balance of about 1200 coaches at the end of the Sixth Five Year Plan. (Para 7.6)

12.9. The Committee have broadly assessed that an additional amount of Rs. 309 crores (net) will be needed during the year 1982-83 under DRF. This would need stepping up of the appropriation to DRF for the year

1982-83 from Rs. 500 crores to Rs. 809 crores. With this additional allotment, primary renewals to an extent of 3,300 kms. secondary renewals of 1,500 kms., replacement of 16,000 wagons and 1,350 coaches should be possible. (Para 8)

12.10. Additional funds required for track renewal and replacement of overaged coaches and wagons during the last two years of the Sixth Five Year Plan should also be taken note of while asking for (a) additional allotments for the Sixth Five Year Plan and (b) contributions to DRF. (Para 8)

12.11. The Ministry of Railways should immediately approach the Railway Convention Committee for enhancing the contribution to the DRF for the year 1982-83 from Rs. 500 crores to Rs. 809 crores. For the subsequent years of the Sixth Five Year Plan, the assessments made by the Committee of the funds required for track renewals and replacements of coaches and wagons should be taken note of and appropriation to DRF fixed accordingly. (Para 9)





## CHAPTER II

### SAFETY AND ACCIDENT PREVENTION

#### 1.0. Introduction.

1.1. All train accidents involving loss of life and limb are naturally a matter of considerable concern both to the Government and the country. Unfortunately there have been many such accidents during 1981-82. The railway management has, however, reacted in a positive manner. A multi-disciplinary team of Joint Directors was promptly appointed to monitor surveillance of safety. This team worked from June, 1981 to January, 1982. From February, 1982, it was replaced by a team of more senior officers of the rank of Directors. This team has been carrying out survey of the field conditions and advising on aspects pertaining to safety.

#### 2.0. Recent Trends of consequential accidents.

2.1. The position of consequential † accidents for the last six years and its incidence per million kilometres, which is the accepted norm, is given below :

Year	No. of consequential train accidents	No. of deaths as a result of these accidents	Incidence of consequential train accidents per million train kms.
1976-77	780	167	1.5
1977-78	866	303	1.6
1978-79	931	172	1.8
1979-80	900	282	1.8
1980-81	1,013	244	2.0
1981-82	1,041*	660**	N.A.

It would be observed that the incidence of consequential accidents has unfortunately recorded a continuous increase, and the number of deaths in these accidents recently have been unduly high.

#### 3.0. Enquiry Committees of the past.

3.1. Safety performance of the railways has been reviewed in the past in a big way by three high-power enquiry committees :

- (i) Railway Accidents Committee, 1962 under the Chairmanship of Shri H.N. Kunzru, (Hereinafter referred to as Kunzru Committee). It submitted its Report in two parts : once in December, 1962 and the other in November, 1963.
- (ii) Railway Accidents Enquiry Committee, 1968 under the Chairmanship of Shri K.N. Wanchoo. (Hereinafter referred to as Wanchoo Committee). It submitted its Report in two parts : first part in November, 1968 and the second in August, 1969.

- (iii) Railway Accidents Enquiry Committee, 1978 under the Chairmanship of Shri S.M. Sikri. (Hereinafter referred to as Sikri Committee). It also submitted its Report in two parts : first in July 1979 and the second in May, 1980.

3.2. These Committees have gone into the entire gamut of railway working related to accidents and safety and made several recommendations to improve the railway's safety performance. The last Report is too recent to justify another detailed scrutiny. We have, therefore, not considered it necessary to make a fresh investigation.

3.3. We have studied the above reports along with the information provided by the railways on various recommendations and have observed that many recommendations have been repeated from one Committee to the other. It has, therefore, struck us that the recommendations of these high-power accident committees have not received the attention which they deserved. This would be illustrated from the manner in which the recommendations are processed in the Railway Board. To quote an example, the Sikri Committee had observed "that having laid down a yardstick of workload for S&T Inspectors, the Railway Board must take urgent steps to implement it within the shortest possible time. "The Board have stated : "instructions have been issued to the Zonal Railways to implement the yardstick for determining the strength of Signal and Telecommunication Inspectors in consultation with the Finance." adding that "in view of the tight financial position of the railways, complete implementation of the recommendations has to be done only in stages as and when the resource position improves."

3.4. A number of recommendations both of the Wanchoo and Sikri Committees, though accepted, have remained unimplemented. In a number of cases, while directions have been issued by the Railway Board or by the Zonal Headquarters, action has not been taken at lower levels. Obviously the safety aspect cannot be improved unless a serious effort is made at all levels to implement the recommendations. The methodology of acceptance and implementation of the recommendations pertaining to safety definitely requires improvement. Many recommendations have suffered in the field because of procedural delays. To get over this, it would help if for implementing a recommendation, the expenditure, where possible, is quantified right at the acceptance stage. Even in the case in which the expenditure has to be spread over a period, money sanction should issue along with the acceptance order.

3.5. We consider that there should be no dichotomy between quicker movement of freight and passengers, on the one hand, and their being moved with due regard to safety, on the other.

\* Upto February, 1982

\*\* Upto January, 1982

† Consequential accidents are train accidents which involve or

are likely to involve risk to life, limb and property, viz., collisions, derailments, trains running into road traffic at level crossings and fires in trains.



#### 4.0. Some of the important recommendations, which have not been implemented.

4.1. We have selected a few recommendations made by the high-power accident enquiry committees, which, though accepted, have not been implemented and which either relate to potential causes of accidents or outline definite preventive measures, and the implementations of which would significantly improve the level of safety.

#### 4.2. Speedometer on locomotives.

4.2.1. The Wanchoo Committee had recommended that all locomotives working on trains must be equipped with speedometers and that energetic steps should be taken to see that a more suitable and reliable type of speedometer-cum-speed recorder is manufactured indigenously and brought into use.

4.2.2. The Sikri Committee, in their review, have observed : "the recommendation of the Wanchoo Committee accepted by the Railway Board, has still not been implemented and the Railway Board's claim in this regard is not corroborated by the information supplied by the Railway". further stating : "the Railway Board must ensure that speedometers/speed recorders are provided on all locomotives working trains and no locomotive, which is to work a train, leaves the shed or yard without speedometer/speed recorder in working order". Further, the development/manufacture of an indigenous design, which would give satisfactory performance in the field has not been pursued with vigour. The speedometer design, which has been selected for use, is basically suited for road vehicles and its high failure rate is a pointer to its unsuitability for service on locomotives. "While these speedometers are expected to be in satisfactory service for about three months, they actually go out of order within a few days:" even though locomotive workshops are equipped with speedometer repair sections, they have not been able to cope with the workload.

4.2.3. The Sikri Committee pointed out that during 1977-78, "out of 19 serious accidents in the categories of collision and derailment, which were enquired into by the Commission of Railway Safety, unsatisfactory maintenance and non-provision of speedometers had come in for severe criticism" in six cases.

4.2.4. Every driver working a train is required to observe a specified speed limit and without a reliable speedometer, he cannot ensure strict compliance.

4.2.5. It is realised that the speedometer has an allied problem also of functioning as a speed recorder to enable the management to have a counter check on the performance. A major problem also is the provision of speed-recorders in addition to the existing speedometers in Diesel and Electric Locomotives. These speed recorders do not function well and also create confusion by displaying different speed ratings from non-recording instruments. The present design is very unsatisfactory. We recommend immediate import of proven design for fitment in the first stage on all mail/express and trunk passenger train locos, followed by all goods train locos running on the trunk routes. The development of a digital and electronic device should also be undertaken as a high priority project. The speed recorders should function without need to replace the charts atleast for a week so as to ensure that the drivers have not to replace or handle the recorders enroute.

#### 4.3. Examination of coaching stock.

4.3.1. The Wanchoo Committee had strongly urged provision of adequate number of washing and pit lines

with ancillary facilities so that all coaching rakes could be properly examined and maintained. They had also stressed the need for timely placements. The Sikri Committee have observed that not only adequate facilities were not developed, but that the gap between the requirement and the availability of facilities for maintenance of coaching stock had widened due to the introduction of additional trains. At the same time, statistical analysis indicated an increase in the derailments due to defects in carriages by 37.0 and 15.0 percent on the broad and metre gauges respectively during the years 1973-74 to 1977-78 as compared to the previous five year period from 1968-69 to 1972-73.

4.3.2. Possibly such a thing happened because the Board, while accepting the recommendation, did not authorise expenditure by a financial sanction for the creation of necessary facilities and that Divisional level efforts, if made, got lost in procedures.

4.3.3. Even where facilities for coaching rake maintenance are available, all the coaching rakes were not being placed on the washing and pit lines for maintenance. Major railway operational centres like Bhopal, Jhansi, Madras Central, Cochin Harbour Terminus, were specifically mentioned by the Sikri Committee where the placement of rakes was not satisfactory. Slip coaches were also receiving inadequate attention.

4.3.4. We recommend that the Railways should ensure proper placements and create the necessary facilities, wherever required. The placement and maintenance as at present results in wasteful efforts owing to the existence of separate facilities for mechanical and electrical maintenance and dual authority control. It would clearly be advantageous in both time and resources if maintenance is co-ordinated under a single authority. It is appreciated that there may be constraints of space. This can be remedied by mechanising some of the maintenance facilities.

#### 4.4. Examination and repairs to goods stock.

4.4.1. The Kunzru committee had "stressed the need for the adoption of a uniform basis for fixing the time schedule for train examination and for determining the strength of examining gangs essential for proper examination and repairs of trains." Some measure of uniformity in train examination time and the gang strength is, therefore, apparently called for.

4.4.2. The Sikri Committee noted that instructions had been issued by the Railway Board in June, 1969 indicating the time schedule for intensive/safe-to-run, examination. In September 1971, instructions went out from the Railway Board enjoining certain yardsticks for the composition of carriage and wagon gangs which would do 'intensive examinations of the requisite standard. In October, 1972, the Railway Board clarified that the earlier directive of September, 1971 should be taken only as a broad guide-line and that no upgradation of posts was envisaged. March 1978, the Railway Board asked the Zones to advise on the minimum additional requirements of staff on the basis of the guidelines contained in their directive of September 1971, implying that little or no progress had been made and that the issue had not really been tackled. Subsequently, the pattern of examination itself was changed and the entire system was required to be studied *ab initio*. Evidently, the treatment given to the recommendation could result only in non-action and a continuing uncertainty in priority and procedure.

4.4.3. The purpose of train examination is a part of a total operation-strategy to achieve quicker movement.



This would require repairs being undertaken along with the examination so that by and large no detachments become necessary at the originating end or enroute.

4.4.4. Viewed in the background of increase in the number of derailments caused by defects in wagons to 398 and 483 during 1973-78 as compared to 287 and 443 during 1968-1973 on the B.G. and M.G. respectively, delay in the rationalisation of goods train examination is a matter which requires immediate attention, specially in view of the changing streams of traffic and the modern types of rolling stock.

#### 4.5. Breakage of bearing springs of BOX wagons.

4.5.1. The Wanchoo Committee recommended that in view of the inadequate effectiveness of the clamps to prevent displacement of the broken end of the spring, the wagon with a broken spring should be detached at the station where this defect was detected. This recommendation was accepted. The Sikri Committee, however, found that the practice of clamping of broken springs was being continued. The latest instructions provide for clamping upto next the traction-changing point. There are instances where this relaxation is frequently being exceeded on some ground or the other.

4.5.2. It is appreciated that in cases where spring breakages are observed in block sections, the wagons have to be carried to the next station, there being no other alternative, and clamping may be considered as an expedient reducing the risk. However, taking it to the next station, which may only be a few kilometres is different from carrying it for longer distances of 50 kms. or more. Evidently, either the acceptance of recommendation has been incorrectly implemented or clamping is perhaps no more taken as a serious hazard. The Railway Board should, therefore, issue unambiguous instructions in the matter, instructions that would be consistent with both fluidity of operation and requirements of safety.

#### 4.6. Overloading of BOX wagons.

4.6.1. The Wanchoo Committee had been informed that BOX wagons were invariably overloaded and at time to the extent of as much as 12 tonnes per wagon. They stated that it was essential to find a satisfactory solution to the problem to reduce the incidence of breakage of springs.

4.6.2. An Additional Commissioner of Railway Safety, Eastern circle, in one of his inspection reports for 1977-78, had observed that no adjustment was being done in the case of overloaded BOX wagons and that the extent of overloading was as much as 50 to 60 per cent of the carrying capacity.

4.6.3. The Sikri Committee have reported that on the basis of the evidence tendered before them, the impression gained was that large scale overloading of a BOX wagon was still rampant. They have also mentioned that the scrutiny made at Andal yard on Eastern Railway indicated that in some BOX rakes, out of 30 BOXs, 28 or 29 BOXs were overloaded, generally to the extent of 6 to 12 tonnes.

4.6.4. This problem has to be tackled by taking steps to prevent overloading essentially by the bulk consumers at the loading stage itself. It is primarily the bulk loaders, who are responsible for blatant overloading. The detection for such wagons does not offer a lasting solution because detection by itself is not a deterrent. Moreover it does not appear possible to make satisfactory arrangements for off-loading the contents in the

yards. Such a recourse would also cause unacceptable delays. The Committee, therefore, recommend that the problem has to be solved by imposing in the first instance a penalty on the loaders responsible for over loading. This penalty could be of the order of say Rs. 2,000/- per wagon and in no case to be waived. If necessary, the penalty could be even more deterrent.

#### 4.7. Hot box detector.

4.7.1. The Wanchoo Committee recommended study and research to develop a hot box detector. This device would enable detection of hot boxes while the wagons are on the move and thereby prevent accidents. Several years have passed but the hot box detector has not been introduced.

#### 4.8. Marshalling of anti-telescopic coaches on passenger trains.

4.8.1. The Wanchoo Committee had recommended marshalling of anti-telescopic coaches at either end in preference to steel-bodied coaches and this was accepted. The Sikri Committee have commented that due to shortage of such stock, the instructions, though issued, had not been properly implemented.

4.8.2. Clearly, production of anti-telescopic coaches needs to be increased on priority. On the broad gauge, the shortage of anti-telescopic/steel-bodied coaches and SLRs, against the standards is to the extent of almost 33 per cent of the requirement. The Commission of Railway Safety and the Sikri Committee have also referred to wooden-bodied coaches being used in place of SLRs which are a definite safety hazard. It is essential that passenger trains are run with stipulated marshalling without any exception.

#### 4.9. Brake power.

4.9.1. The Wanchoo Committee considered the availability of requisite brake power essential to safe train operation. Rules provide ensuring 85 per cent and 80 per cent effective vacuum brake cylinders on all broad and metre gauge goods trains respectively.

4.9.2. The Sikri Committee have concluded that most of the trains do not have the requisite percentage of effective brake cylinders. The problem gets aggravated due to fade-outs on the run.

4.9.3. The implementation of this recommendation does not appear to have been pursued with due seriousness. Possibly this has been due to an anxiety that freight movement would come to a standstill if this is rigidly implemented. In our view, this problem can be tackled by improving the quality of the examinations by making them thorough and exhaustive, particularly at 'originating' points and this, therefore, should be arranged in a forthright manner.

#### 4.10. Vacuum gauges on trains.

4.10.1. The Wanchoo Committee strongly recommended the provision of vacuum gauges in the brake vans. The Sikri Committee have commented that even though the Railway Board had viewed the absence of vacuum gauges in the brake vans as a matter of serious concern and had wanted effective steps to be taken to ensure that such lapses were not allowed to occur even in isolated cases; the fact was that goods trains were in practice still being run without vacuum gauges. The guards working on goods trains had contended that the existing methodology of their having to fix vacuum gauges was not practicable. Further, it was also not



possible for the instrument to stay in position during the run due to intense vibrations in the brake vans because of which the vacuum gauge either got detached or got damaged internally. The Commission of Railway Safety have also pointed out in some enquiry reports on accidents that brake power certificates issued by the train examiners were not in order. In a number of cases, the trains were being started without recording on the certificate the vacuum available in the engine or the brake van. Absence of vacuum gauges in the rear brake van and incorrect preparation of brake certificates is not a matter which should be by passed or overlooked. The vacuum gauges were made a part of the guard's equipment because of large-scale thefts. We recommend that firstly measures be taken to fix the vacuum gauge in the brake vans, that they are no more included in guard's equipment, and finally that they are fitted with a locking device so that the thefts can be effectively controlled.

#### 4.11. Track renewal.

4.11.1. The Wanchoo Committee had recommended adequate quantum of track renewal to be carried out annually so that the backlog could be tackled.

It is, however, found that this rising trend has not only been arrested, but has been allowed to deteriorate, with increased risks of accidents (This subject has been discussed in the preceding chapter).

#### 4.12. Unserviceable sleepers in track.

4.12.1. The Wanchoo Committee had suggested that the percentage of unserviceable wooden sleepers in track should be reduced to the barest minimum. As pointed out in the Sikri Committee report, as on 31 March, 1978 there were 9,174 kms. of track where the proportion of unserviceable sleepers was in excess of 20 percent. Thus the percentage of unserviceable sleepers, instead of coming down had in fact gone up. (This problem has also been dealt with in the preceding chapter).

#### 4.13. Ultrasonic testing of rails.

4.13.1. The Wanchoo and Sikri Committees have both recommended that self-propelled ultrasonic rail inspection cars be developed and used for testing of rails. The existing method of testing rails by mutually operated ultrasonic rail flow detectors is slow and not fully effective in as much as the inference drawn from such manually operated devices depends on the ability of the individual operators to identify and interpret signals received on the oscilloscope screen. Continuous screening by the operator is monotonous and he is liable to make mistakes. We recommend that an immediate start may be made by importing nine cars—one for each zonal railway.

#### 4.14. Level crossings.

4.14.1. Norms for manning of unmanned level crossing and upgrading of manned level crossing.—The Wanchoo Committee had recommended laying down of norms for manning unmanned level crossings or for upgrading the existing manned crossings.

The Sikri Committee have observed the existence of widely divergent norms. For manning an unmanned level crossing, the combined density of rail and road traffic reckoned in terms of train vehicle units (TVUs) is taken into consideration. The criteria followed on the railways varies from 1,000 to 5,000 TVUs.

4.14.2. The Sikri Committee noted with concern that even where the need to man an unmanned level crossing or upgrading the manned level crossing had been established, the actual manning/upgradation of the same took a very long time due to delays in getting the works sanctioned and obtaining the concurrence of the state government. This is an important safety precaution as lapses in this respect have resulted in a number of accidents. The Committee recommend that 20 percent of the Road Safety Works Fund which is kept for direct expenditure by the Railway Board should be equitably distributed amongst the various zonal railways. Wherever approval of the state government is required, they should be consulted with the stipulation that they should communicate their approval within a specified period, say one month, after which it should be assumed that the state government had no objection. Further we recommend that manning of accident-prone level crossings based on the norms of the Railway Board should be proceeded with by the zonal railways without the need to obtain approval of the Railway Board.

#### 4.15. Railway Safety Works Fund.

4.15.1. The Wanchoo Committee had noted that there had been hardly any expenditure but of the Railway Safety Works Fund (RSWF) primarily because of the cumbersome procedure for operating the Fund.

The tardy progress in the utilisation of resources available in RSWF for replacement of level crossings by overbridges or underbridges was commented upon also by Sikri Committee. A sum of about Rs. 15 crores was lying to the credit of this Fund in early 1979.

Presently, the Fund is operated in two parts, i.e. 80 percent for re-imbursements to state government towards the cost of replacement of level crossings by road overbridges and underbridges etc. and 20 percent on works of manning unmanned level crossings and up-grading existing manned level crossings. We find little justification in not utilising this Fund to the optimum and strongly recommend that this done be on a time-bound programme.

#### 4.16. Provision of communication between level crossings and adjoining stations.

4.16.1. The Wanchoo Committee recommended provision of reliable communication between the gateman of a level crossing with the adjoining stations. The Railway Board had issued instructions for the provision of telephone facilities at all Special, A and B class level crossings and only such of the C class manned level crossings on the Rajdhani routes as are in the block section and normally kept open to road traffic. The Sikri Committee found that the progress of provision of telephone communication at manned level crossings had been as under :

Type of level crossings	Total number of level crossings	Level crossings not provided with telephone connections	
		Number	%age
Special Class	241	24	10
A Class	1,156	114	9.9
B Class	3,523	1,153	32.7
C Class	7,410	3,488	47.1

Thus fairly substantial number of level crossings still remain without telephone communication.



4.16.2. The Sikri Committee had observed that the rate of accidents at manned level crossings provided with telephones was much less than that at those without telephones which is illustrated by the following figures:<sup>\*</sup>

<i>Description</i>	<i>Provided with telephones</i>	<i>Not provided with telephones</i>
Number of accidents at manned level crossings.	112	201
Total number of manned level crossings.	7,031	4,096
Rate of accidents at level crossings.	0.02	0.05

4.16.3. Clearly, more vigorous implementation policy is called for.

#### 4.17. Signalling and interlocking.

##### 4.17.1. Electric lighting on semaphore signals.

The Wanchoo Committee had urged the Railways to opt for electric lighting of semaphore signals in a big way where feasible.

4.17.2. The Sikri Committee had observed that even though the Railway Board had accepted this recommendation and issued a directive in May, 1970, electric lighting of semaphore signals had been provided only at 42 stations.

4.17.3. This Committee also observed that while the Railway Board had given directions to provide electric lighting of distant signals at stations provided with MAUQ/MLQ signalling, by September, 1979, not much progress has been achieved.

#### 4.18. Braking distances and inter-signal distances.

4.18.1. The Kunzru Committee had recommended that trials should be conducted to determine the braking distances for various speeds/routes etc. so as to determine the sighting distance of signals and resiting them, where necessary. The Wanchoo Committee had noted that the results of braking distance trials had become available and hoped that these would soon be reflected in the siting of signals.

4.18.2. The results of braking distance trials were circulated to the Railways by RDSO in March, 1974. As a result of this, several railways had sought the guidance of the Railway Board for resiting of signals to ensure that inter-signal distance were not less than the requisite braking distances. This work, except for high speed routes, however, has till not been completed.

4.18.3. An analysis of accident statistics carried out by the Sikri Committee revealed that 19.2 percent (107 out of 557 derailments during the period 1973 to 1978) were attributable to drivers going at excessive speeds, of failing to regulate the running train or failure to control the train resulting in over-shooting; in the category of collisions due to failure of staff, 50.2 percent of the collisions (123 out of 245) during 1973-78 occurred due to drivers disregarding signals or failing to control trains. Visibility distances of signals and inter-signal distances are a decisive aid to drivers being able to control

their trains. The Railways should take urgent steps in this direction so as to complete the resiting of signals on a time-bound programme.

#### 4.19. Sighting Boards.

4.19.1. The Wanchoo Committee considered that improved visibility of sighting boards was essential to ensure that the attention of the drivers is drawn through them particularly at night and at times when visibility is impaired. They suggested that sighting boards should be provided with reflective strips in preference to the ordinary enamel paint which has very limited visibility.

4.19.2. The Sikri Committee noted that even though the Railway Board had decided to provide scotchlite reflective material on sighting boards due to problems involved in the import of scotchlite material, trials were conducted using indigenously available reflectors which were not found suitable. This recommendation should be implemented, if necessary by importing scotchlite reflective material.

#### 4.20. Track circuiting.

4.20.1. The Wanchoo Committee considered the introduction of track circuiting at stations an essential safety device and suggested necessary guidelines and targets for completion of this work.

4.20.2. The Sikri Committee found that track circuiting still remained to be done at 498 and 800 stations on BG and MG respectively. This should now be fully implemented on a time-bound programme.

#### 4.21. Automatic warning and stop system.

4.21.1. The Kunzru Committee had recommended the installation of Automatic Train Control (ATC). The Wanchoo Committee referred to the slow progress in this direction.

4.21.2. The Wanchoo Committee recommended that lines on which speeds of 100 kmph or over are permitted should be provided with ATC, and that it should cover all trains including goods trains running on such sections. The system was recommended to ensure that a driver passing an automatic signal at ON must keep the speed of train below 15 kmph upto the next automatic signal, failing which a warning was sounded for five seconds and thereafter automatic application of brakes took place. The recommendation was to extend the system to other automatic signalling sections in Bombay, Calcutta and Madras areas.

4.21.3. The Sikri Committee referred to the Railway Board having agreed to provide AWS system on priority on trunk routes with speeds of 120 kmph or above covering only mail and express locomotives. Further, only the first stop signal was proposed to be covered under this scheme. Out of 2,780 route kms. programmed for provision of AWS system on trunk routes with speeds of 120 kmph and over, and another 1,128 route kms. on commuter sections in Calcutta, Bombay and Madras areas, the AWS system has been provided on 248 trunk routes and 94 kms. on commuter sections.

4.21.4. The Sikri Committee have further pointed out the absence of any monitoring and of the serious lack of interest in the functioning of the system as installed on certain sections of Eastern Railway.

<sup>\*</sup>The figures are from 1960-69 to 77-78, Part II of Sikri Committee Report.



4.21.5. We recommend the installation of the system on priority, on high-speed and commuter routes to begin with. In areas prone to theft, pilfer-proof housing of fibre glass for all field equipment should be used. Such casing can easily be developed in the country. Not only the implementation should be to a time-bound programme, but it should also be reinforced by effective monitoring.

#### 4.22. Safety organisation.

4.22.1. The Safety organisation was a brain child of Kunzru Committee. The Wanchoo Committee defined its role in the organization clarifying that the individual departments were responsible for safety in their own areas. To illustrate; the engineering department was responsible for the safety of track, as the mechanical branch was for the safety of wagons, locos etc. and the operating side was responsible for movement of traffic. The safety organisation had an important role to see that safe practices were followed by creating adequate consciousness, through its enquiries and analysis of the trends of accidents, and during field inspections.

4.22.2. The Sikri Committee have commented on the practice of putting unwanted people and of frequent changes in this organisation. They have also observed that the safety counsellors are not doing much of counselling to staff, but are largely undertaking inspections and pointing out acts of omission and commission. Recommendations have also been made for effective monitoring of recommendations and regular statistical analysis of trends to promote preventive measures.

These recommendations should receive due consideration.

#### 5.0. Human failure.

5.1. The Wanchoo Committee had observed that failure of railway staff was responsible for 95 to 100 percent of collisions and 67 percent of the derailments. The Sikri Committee on the basis of detailed review of accidents for the years 1968-69 to 1977-79 also reached a similar conclusion. They stated that out of 7,957 consequential accidents during the same period, in which the cause was established, a total of 5,648 accidents were due to failure of staff (3,218 due to direct and 2,430 due to indirect failures).

5.2. The Sikri Committee have concluded that the main factors responsible for these accidents are poor 'personnel management', 'lack of discipline and erosion of authority', 'plurality of trade unions', 'categorywise unions and associations', 'supervisors as member of the staff unions', the lack of will on the part of the senior officers to 'deal' firmly 'with errant workers' due to 'intervention of unions' and 'pressure from political quarters', poor machinery for 'redressal of genuine grievances', reservation of posts during promotion for scheduled castes and scheduled tribes' and increased 'workload of welfare inspectors' etc.

5.3. The Committee feel that while human failure has been recognised as being responsible for maximum number of consequential accidents, no lasting solution appear to have been evolved. We have gathered an impression that accident enquiries have often ended after explaining the cause as 'human failure' and have failed to come to grips with the real causative factors, even when such human failures have been repetitive.

5.4. We feel that this problem has to be considered in depth and we propose to refer to this after fuller examination later.

#### 6.0. Conclusion.

6.1. The above review shows that compromises have been made due to extraneous factors like inadequate outlays, lack of indigenous capabilities, etc. All the above recommendations should, therefore, be implemented, as the penalties for non-observance are heavy. There is clearly need for much higher priority in tackling safety measures.

#### 7.0. Summary of Recommendations and Observations.

7.1. The Accident Enquiry Committees in the past have studied the performance of the railways exhaustively. The last enquiry Committee report is too recent to justify another scrutiny. The Committee have, therefore, not considered it necessary to make a fresh investigation.

(Para 3.2)

7.2. The Committee have studied the reports of the various Accident Enquiry Committees and have concluded that these recommendations have not received the fullest attention they deserved.

(Para 3.3)

7.3. A number of recommendations of the previous enquiry committees have remained unimplemented. In a number of cases, while directions have been issued by the Railway Board or Zonal Headquarters, action has not been taken in the field.

(Para 3.4)

7.4. The Committee consider that safety standards cannot be improved unless a serious effort is made at all levels to implement the recommendations.

(Para 3.4)

7.5. The methodology of acceptance and implementation requires to be improved in as much as the expenditure should be quantified at the acceptance stage and, where possible, money sanction issued along with the acceptance order.

(Para 3.4)

7.6. The Committee have selected a few recommendations made by the highpower accident enquiry committees, which, though accepted, have not been implemented and which either relate to potential causes of accidents or are definite preventive measures and whose implementation would improve safety.

(Para 4.1)

7.7. All locomotives are required to be provided with efficient speedometer-cum-speed recorders: their existing design is unsatisfactory and unreliable. Research has not been pursued vigorously. The Committee recommend immediate import of a proven design for fitment in the first stage on all mail/express locos, followed by the locos working on trunk routes.

(Para 4.2.5)

7.8. Railways should ensure proper placement of coaching rakes in maintenance lines and creation of adequate coaching maintenance facilities, wherever required.

(Para 4.3.4)



7.9. The maintenance of coaching stock should be coordinated by a single authority and the present dichotomy between electrical and mechanical maintenance eliminated. Mechanisation should be introduced in the facilities which would save time in maintenance.

(Para 4.3.4)

7.10. The goods train examination requires to be rationalised to suit the changing streams of throughput and the modern types of stock.

(Para 4.4.3)

7.11. The Railway Board should issue unambiguous instructions regarding movement of BOX wagons with broken bearing springs after clamping them, and enforce them. These instructions should be consistent with the needs of smooth flow of traffic and requirements of safety.

(Para 4.5.2)

7.12. The problem of overloading of BOX wagons should be tackled at the loading end itself. Deterrent penalty should be imposed on the loader at bulk loading points for wagons found overloaded. The Committee suggest consideration of a penalty of about Rs. 2000/- per wagon.

(Para 4.6.4)

7.13. Hot box detectors should be provided.

(Para 4.7.1)

7.14. The production of anti-telescopic coaches and SLRs on priority should be undertaken to overcome their shortage and to ensure that all passenger trains, without exception, are run with the stipulated marshalling order.

(Para 4.8.2)

7.15. Many goods trains are being run with inadequate brake power. This problem can be tackled by improving the quality of the examinations by making them thorough and exhaustive, particularly at originating points, and this should be arranged in a forthright manner.

(Para 4.9.3)

7.16. Absence of vacuum gauges in the rear brake van and incorrect preparation of vacuum certificate is a matter of great concern. Vacuum gauges should be fixed in the brake vans with a locking device.

(Para 4.10.1)

7.17. The backlog in arrears of track renewal is substantial, entailing increased risks of accidents. High-priority action is necessary to wipe out the arrears by increased outlays.

(Para 4.11.1. also para 7.2 of Chapter-I)

7.18. The percentage of unserviceable sleepers in track has gone up. This position should be remedied without further delay.

(Para 4.12.1)

7.19. Immediate import of nine self-propelled ultrasonic rail inspection cars to be used for testing of rails is recommended-one each for each zonal railway.

(Para 4.13.1)

7.20. The Committee recommend that 20 per cent of the Road Safety Works Funds, which is kept for direct expenditure by Railway Board, should be equitably

distributed amongst the zonal railways to accelerate the process of manning/upgrading arrangement of level crossings.

(Para 4.14.2)

7.21. Wherever the state governments are required to be consulted, their approval should be obtained within a stipulated time, and if no reply is received within this time, further action should be taken in hand.

(Para 4.14.2)

7.22. Manning of accident-prone level crossings, based on the norms of the Railway Board, should be done by the zonal railways without approval by the Railway Board being necessary.

(Para 4.14.2)

7.23. A vigorous policy should be pursued to utilise the Railway Safety Works Fund.

(Para 4.15.1)

7.24. A more vigorous implementation policy for provision of communication between level crossings and adjoining stations is recommended.

(Para 4.16.1)

7.25. Progress in connection with electric lighting of semaphore signals is tardy. This should be expedited.

(Para 4.17.3)

7.26. Railways should take urgent steps to complete the resiting of signals on a time-bound programme in conformity with the results of braking-distance trials.

(Para 4.18.3)

7.27. The recommendation of improving the visibility of sighting boards should be implemented.

(Para 4.19.2)

7.28. The progress of track circuiting work should be speeded up.

(Para 4.20.1)

7.29. The Committee recommend installation, on freight-intensive and commuter routes to begin with, of Automatic Warning System on high priority, and with pilfer-proof casing of fibre glass in theft-prone areas. Such cases should be indigenously developed urgently.

(Para 4.21.5)

7.30. The Safety Organisation should be manned by competent officers, with a fixed tenure, who should be divested of miscellaneous functions not related to safety. The Committee also recommend that the safety counsellors should be properly trained for creating safety consciousness and not allowed to act like the line Inspectors doing normal inspections.

(Para 4.22.2)

7.31. The Wanchoo Committee and the Sikri Committee have pointed out, on the basis of detailed review of accidents, that human failure is the primary causative factor for 'consequential' accidents.

(Para 5.1)

7.32. The Sikri Committee have also identified the main factors responsible for such state of affairs as being 'poor personnel management', 'lack of discipline and erosion of authority', 'category-wise union and



associations', 'supervisors as members of the staff unions', 'the lack of will on the part of the senior officers to 'deal firmly 'with errant workers, due to 'intervention of unions', and 'pressure from political quarters', 'poor machinery for redressal of genuine grievances' and 'reservation of posts during promotion'.

(Para 5.2)

7.33. While human failure has been recognised as being responsible for the maximum number of accidents, the accident enquiries have often failed to come to grips with the real causative factors even when such failures have been repetitive.

(Para 5.3)

7.34. Problems referred to in the preceding three paragraphs would require further in-depth study.

(Para 5.4)

7.35. To conclude, the Committee would emphasise the need for implementation of the recommendations discussed in the foregoing paragraphs, without com-

promises. There is clearly need for much higher priority in tackling safety measures, as the penalties for non-observance are heavy.

(Para 6.1)

Sd./-  
Prof. Ravi J. Matthai

Sd./-  
Russi Mody

Sd./-  
Justice H.C.P. Tripathi

Sd./-  
Dr. S.K. Ray  
(Secretary)

27th April, 1982.

\*Please see Annexure I.

Sd./-  
Dr. Manmohan Singh\*

Sd./-  
V.P. Sawhney

Sd./-  
H.C. Sarin  
(Chairman)

Annexure-I

**NOTE**

While I agree that resources for replacement and renewal of Railway assets have to be provided on a priority basis, I am unable to endorse the specific outlays recommended by the Committee under different heads for the years 1982-83 to 1984-85. In my view, the Committee having indicated broad dimensions of the physical programme of replacement and renewal, the matter should thereafter be left to the Ministry of Railways to work out the annual phasing and the requirement of funds year-wise. While replacement and renewal of existing assets must be given high priority, the actual phasing of expenditure must take into account not only the physical capacity to implement a programme of a given size but also the availability of financial resources and competing claims thereof.

Sd./-  
Manmohan Singh

27th April, 1982.





सत्यमेव जयते

भारत सरकार Government of India  
रेल मंत्रालय Ministry of Railways

# REPORT OF THE RAILWAY REFORMS COMMITTEE



सत्यमेव जयते

Part II

TRANSPORTATION

OCTOBER, 1983



## ABBREVIATIONS

ACP	.. Alarm Chain Pulling	ICF	.. Integral Coach Factory
ACSPF	.. Accident Compensation, Safety & Passengers Amenities Fund.	IISCO	.. Indian Iron & Steel Company
BEL	.. Bharat Electronics Ltd.	IRCON	.. Indian Railway Construction Company
BEML	.. Bharat Earth Movers Ltd.	IRR	.. Internal Rate of Return
BG	.. Broad Gauge	ISO	.. International Standards Organisation
BTU	.. British Thermal Unit	MG	.. Metre Gauge
C & W	.. Carriage & Wagon	MTP	.. Metropolitan Transport Project
CLS	.. Colour Light Signalling	NG	.. Narrow Gauge
CLW	.. Chittaranjan Locomotive Works	NITIE	.. National Institute of Training in Industrial Engineering.
CPLO	.. Chief Planning Officer	NTKM	.. Net Tonne Kilometres
CTPC	.. Committee on Transport Policy and Co-ordination, 1966.	NTPC	.. National Transport Policy Committee, 1980.
DC	.. Discounted Cash Flow	OHE	.. Overhead Electrical Equipment
DF	.. Development Fund	PKM	.. Passenger Kilometres
DLW	.. Diesel Locomotive Works	RITES	.. Rail India Technical and Economic Services
DRF	.. Depreciation Reserve Fund	RKM	.. Route Kilometres
EKM	.. Engine Kilometres	RTEC	.. Rail Tariff Enquiry Committee, 1980
EMT	.. Electric Material Train	SAIL	.. Steel Authority of India
EMU	.. Electric Multiple Unit	SNCF	.. Societe Nationale des Chemins de Fer Francais.
ETS	.. Electric Trains Sets	TISCO	.. Tata Iron & Steel Company
GTKM	.. Gross Tonne Kilometres	TKM	.. Track Kilometres
HAL	.. Hindustan Aeronautics Ltd.	VP	.. Bogie Parcel Van





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## INTRODUCTION

The Railway Reforms Committee, appointed by the Government of India to examine and report on various aspects of railway working, vide their Resolution No. ERB-I/81/21/41 of 12 May, 1981, have already submitted Part-I of their Report in the beginning of May, 1982. This was to invite the immediate attention of the Government to the need for priority renewal and rehabilitation of the permanent way and the rolling stock and to matters relating to accidents and safety, as overlooking these involved heavy penalties in respect of both safety and operational efficiency.

Having done that, the Committee have deliberated on the methodology and submission of their Report and are of the view that it would be convenient and more useful, from the view-point of implementation, if the Committee were to submit their Report in several parts, each part dealing with a specific subject or a group of subjects.

Part-II, now being submitted, is the first in the series of the Committee's long-range and perspective Reports. This Part deals with matters relating to rail-borne transportation, which is the basic responsibility of the Railways. An attempt has been made to quantify the profile of traffic growth on a national basis and also specifically in relation to the quadrilateral and the diagonals\*, which carry over seventy per cent of the total rail transport. We have later discussed, in a chapter each, issues relating to transport planning, passenger transport and punctuality performance, freight transport, international freight, containerisation & Port Trust Railways, as well as traction policy and railway electrification.

By itself, transportation cannot be said to hold the key to progress. But it is vital and pervasive in its influence on almost all other factors relevant to economic development. It, as is said, brings land to economic exploitation, motivates labour and capital to proliferate, leads industry and agronomy to develop, and trade and commerce to discover new frontiers. In India, the Railways role in the national transportation system is immeasurable.

For the Railways, there is need for a precise enunciation of objectives of the system. The Corporate Plan for the Indian Railways, 1979, defined the objectives as under :

- "1. To provide rail transport for both passenger and goods, adequate to meet demand in such areas for which railway operation confers optimum benefit to the economy, having due regard to Government's policy of development of backward areas ;
2. To provide such rail transport at the lowest cost consistent with :
  1. the requirements of the railway users and safety of operation ;
  2. adequate provision for replacement and some provision for development of business ; and
  3. the least amount of pollution of the environment.
3. To work in association with or utilise other modes of transportation, such as pipelines and road transport corporations, and the engage in ancillary activities necessary to subserve above two objectives.

4. To establish a corporate image of the Railways as being an up-to-date business organisation with the interests of the public and of the nation as its prime objective ; and
5. To develop organisationally effective personnel with pride in their work and faith in the management".

In the opinion of the Committee, when the objectives of a system become all-pervasive, they also tend to get diffused and indeterminate, and fail to provide the basic charter of responsibilities for the management and the staff and, oftentimes, ancillaries assume greater importance than the basics. Soon enough in their investigations, the Committee became aware that such a situation has arisen in the context of the performance of the Railways. Thus, for instance, instead of concentrating their attention on basic commercial functions in which considerable leeway remained to be covered, the Railways early in the post-independence era took away catering from the private sector as an additional responsibility, but have not been able to distinguish themselves in this area. Similarly, instead of concentrating on the development of facilities on long-distance movement of both freight and passenger the railways have in some measures involved themselves with some short-distance losing traffic in both freight and passengers.

The Committee, therefore, believe that it is essential that the objectives of the Indian Railways should be clearly enunciated. They should be re-stated as : The movement of passenger and freight transport, by a proficient and disciplined personnel and modern and competent management. They should at the same time have full regard to economy, comfort and efficiency, modernisation, energy-saving, and safety, for the largest practicable volume of national transportation, for optimum economic development, and in an overall transport-mix for which the Railways are more suited than the other complementary modes of traffic.

In the introduction for Part-I of their report, the Committee had mentioned that they had adopted a multi-pronged methodology in considering different aspects of the issues before them, and that as many as eighteen working groups and six consultancies had been constituted consisting of specialists from within and outside the Government. Most of these Reports have now been received. Discussions have also been held with railway officers, trade unions, chambers of commerce and industry etc. on most of the zonal Railways, and with the Chief Secretaries and concerned departmental Secretaries of many of the State Governments. Similarly, discussions have been held with different Directorates of the Railway Board as also with the Chairman and Members of the Board. Discussions have also been held with all the former Chairmen of the Railway Board and a former Union Railway Minister.

It has become clear that the Railways need to further streamline and rationalise their operations not only in the realm of freight transport, but also in regard to passenger business. The Committee believe and hope that if prompt and adequate action is taken on the basis of the recommendations made by them, it would help the Railways to improve their image and performance, and also to achieve the basic streamlining of methods and procedures essential for successfully tackling the responsibilities facing them in the context of the expected growth of traffic in the next few decades.

\* The quadrilateral routes are those which connect Calcutta-Delhi, Delhi-Bombay, Bombay-Madras and Madras-Calcutta.

The diagonal routes connect Calcutta, to Bombay and Delhi to Madras.



# CHAPTER I

## PROFILE OF TRAFFIC GROWTH

### 1.0. Introduction.

1.1. To build up a strategy for operation and growth, it is necessary to first size up the dimension of the problem. The Committee have, therefore, made an assessment of the profile of growth in rail-transport requirements from the immediate future to the end of the century (2000 A.D.) both in terms of passenger and freight transport.

1.2. In doing so, they have taken into consideration the computations made by the National Transport Policy Committee, 1980 (NTPC) and the Rail Tariff Enquiry Committee, 1980 (RTEC). Both these Committees have recently gone into the question of traffic growth in some detail. Besides, some consultancy

reports produced in recent years by specialist institutions such as Tata Economic Consultancy Services† were also studied.

### 2.0. Passenger Traffic.

2.1. RTEC have explored the growth of passenger traffic and attempted a correlation with different patterns arising from studies made for the years 1950-51 to 1977-78.

2.2. The actual growth of traffic in terms of both originating passengers and passenger kilometres is shown in Tables 1.1 and 1.2 (pages 2 & 3). For the first four Five Year Plans, the computation has been for the whole plan, while from 1974-75 this has been shown annual

Table 1.1  
Growth of passenger traffic on the Indian Railways

Year		Originating passengers (In millions)					
		Suburban		Non-Suburban		Total	
		No.	Index*	No.	Index*	No.	Index*
1950-51 (Commencement of First Plan)	..	417	100	867	100	1,284	100
1955-56 (End of First Plan)	..	499	120	776	88	1,275	99
1960-61 (End of Second Plan)	..	685	164	909	105	1,594	184
1965-66 (End of Third Plan)	..	1,025	246	1,057	122	2,082	162
1968-69 (End of Inter Plan)	..	1,084	260	1,120	130	2,213	172
1973-74 (End of Fourth Plan)	..	1,437	345	1,217	140	2,654	207
<b>Fifth Plan</b>							
1974-75	..	1,373	329	1,056	122	2,429	189
1975-76	..	1,639	393	1,306	151	2,945	229
1976-77	...	1,802	432	1,498	173	3,300	257
1977-78	..	1,928	462	1,575	181	3,503	273
1978-79	...	2,113	506	1,606	185	3,719	290
1979-80	..	1,903	456	1,602	184	3,506	273
1980-81	..	2,000	480	1,612	186	3,612	281
<b>Growth of traffic in 1980-81 over 1973-74</b>							
Total growth	..	39.2%		32.9%		36.0%	
Average annual growth	..	5.6%		4.7%		5.2%	

† This study was undertaken by the Tata Economic Consultancy Services for the Ford Foundation as a part of a project, 'Second India in 2000 A.D.'

\* All figures of 1950-51 have been reckoned as 100 and on this index subsequent figures have been worked out.



Table 1.2

## Passenger kilometres (in billions)

Year	Suburban		Non-suburban		Total	
	No.	Index	No.	Index	No.	Index
1950-51 (Commencement of First Plan)	6.6	100	60.0	100	66.6	100
1955-56 (End of First Plan)	8.1	124	54.3	91	62.4	94
1960-61 (End of Second Plan)	11.8	179	65.8	110	77.6	117
1965-66 (End of Third Plan)	17.2	261	79.1	132	96.3	145
1968-69 (End of Inter Plan)	19.5	300	87.4	146	106.9	161
1973-74 (End of Fourth Plan)	28.0	424	107.6	179	135.6	204
<b>Fifth Plan</b>						
1974-75	27.2	412	99.1	165	126.3	190
1975-76	32.9	498	115.9	193	148.8	224
1976-77	37.1	562	126.7	211	163.8	245
1977-78	39.4	597	137.3	229	176.7	266
1978-79	43.4	657	149.5	249	192.9	290
1979-80	38.7	586	159.9	267	198.6	299
1980-81	41.1	622	167.5	279	208.5	313
<b>Growth of traffic in 1980-81 over 1973-74</b>						
Total growth	46.7%		55.5%		53.4%	
Average annual growth	6.7%		7.9%		7.6%	

3.0. Non-suburban traffic .

suburban traffic are indicated in Tables 1.3 and 1.4 (page 4).

3.1. Further details of growth of non-suburban and

Table 1.3

## Growth in non-suburban passenger traffic on the Indian Railways

Year	Originating passenger traffic (in millions)	Passenger Kms. (in millions)	Passenger coaches (units)	Vehicle Kms. (in millions)	Train Kms. (in millions)
1950-51	867	59,996	13,109	2,678	154
1955-56	776	54,273	15,984	3,046	175
1960-61	909	65,847	20,178	3,594	190
1965-66	1,057	79,059	22,804	4,277	214
1970-71	1,204	95,068	24,676	4,636	225
1975-76	1,306	115,899	26,309	4,948	229
1979-80	1,602	159,927	27,290	5,622	254
1980-81	1,612	167,472	27,472	5,582	258



Table 1.4  
Growth in suburban passenger traffic\*

Year	Originating passenger traffic (in millions)	Passenger Kms. (in millions)	Lead (in Kms.)	EMU coaches	Vehicle Kms. (in millions)	Train Kms. (in millions)
1950-51	417	6,551	15.9	460	119.8	9.28
1955-56	499	8,127	16.4	574	145.6	10.92
1960-61	685	11,818	17.3	846	196.8	14.05
1965-66	1,025	17,234	16.8	1,355	263.6	16.08
1970-71	1,227	23,051	18.8	1,750	369.4	23.05
1975-76	1,639	32,862	20.1	2,217	504.5	30.38
1979-80	1,903	38,730	20.4	2,474	587.6	35.05
1980-81	2,000	41,086	20.5	2,625	601.5	35.55

3.2. The correlation between the population and the non-suburban passenger traffic, both for passenger originating and for passenger kilometres is indicated in Table 1.5. It also indicates the growth relationship.

Table 1.5 ‡  
Population and non-suburban passenger traffic : growth rate

Year		POP	POT	POP : POT†	PKM	POP : PKM
1950-51	TP	361.1	872	..	59,966	..
	AP	202.2				
1960-61	TP	439.2	914	..	65,895	..
	AP	237.2				
1970-71	TP	548.2	1,212	..	95,136	..
	AP	285.1				
1977-78	TP	638.4	1,576	..	137,271	..
Growth Rates						
1950-51 to 1960-61	TP	21.61	4.80	1 : 0.22	9.89	1 : 0.4
	AP	17.31		1 : 0.27		1 : 0.57
1960-61 to 1970-71	TP	24.80	32.60	1 : 1.31	44.37	1 : 1.79
	AP	20.19		1 : 1.61		1 : 2.20
1970-71 to 1977-78	TP	16.42	30.03	1 : 1.83	44.29	1 : 2.70
	AP	16.45		1 : 1.83		1 : 2.69
1950-51 to 1977-78	TP	76.80	80.70	1 : 1.05	128.91	1 : 1.68
	AP	73.60		1 : 1.10		1 : 1.75

\* Suburban traffic has been discussed separately in paras 6.0 onwards.

POP : Population in million numbers.

POT : Passenger originating traffic in million numbers.

PKM : Passenger kilometre traffic in million.

TP : Total population.

AP : Adjusted population calculated at the rate of 56% of total population for 1950-51, 54% for 1960-61, 52% for 1970-71 as per Census Reports and 55% for 1977-78 as per World Bank Report.

† Growth rate relationship.

‡ Rail Tariff Enquiry Committee, Volume IV, page 16.



3.3. Based on the trends of growth, RTEC delineated the projected growth for 2000 AD under four different alternatives. These are on the basis of :

1. observed growth rate relationship between population and the non-suburban traffic during the period 1950-51 to 1977-78;
  2. higher assumed rate than the observed one used for alternative 1;
  3. observed growth relationship in the 1970s; and
  4. the assumption that population-to traffic growth-rate ratio would increase from 1977-78 to 2000 AD at the same rate as the actual increase in the ratio between the Sixties and the Seventies.
- 3.4. The results are summarised in Table 1.6 (page 7).

3.5. These estimates vary from 279 billion passenger Kms. to 467 billion passenger Kms. RTEC recommended 320 billion passenger Kms. This implies a growth rate of 5.4 percent on 1977-78 and 5.7 percent on 1979-80 for originating passengers. In terms of passenger kilometres, the corresponding growth rate comes to 6.1 and 4.5 percent respectively.

3.6. NTPC in its Report have also sought to define the non-suburban passenger growth. They have adopted two estimates and have indicated the figures shown in Table 1.7 (page 8).

3.7. While RTEC have given a growth rate of passenger kilometres within a range of 279 billions to 467 billions for 2000 A.D., NTPC have derived a figure of 300 billions. The second alternative of RTEC projections, which pegs the growth at 320 billion, is the nearest meeting point with the projection of NTPC.

Table 1.6\*

## Projected non-suburban passenger traffic : growth rate

	Alternative I	Alternative II	Alternative III	Alternative IV
1. Projected population growth adjusted at 15-59 years age group (1977-78 to 1999-2000).	59.1	59.1	59.1	59.1
2. POP/POT growth rate relationship	1 : 1.10	1 : 2.0	1 : 1.83	1 : 2.56
3. Expected growth rate in POT	65.0	118.2	108.2	151.3
4. POT in 1977-78 (in millions)	1,576	1,576	1,576	1,576
5. Projected POT in 2000 AD (in millions)	2,601	3,439	3,280	3,960
6. POP/PKM growth rate relationship	1 : 1.75	1 : 2.25	1 : 2.70	1 : 4.07
7. Expected growth rate of PKM	103.4	133.4	156.6	240.5
8. PKM in 1977-78 (in millions)	1,37,271	1,37,271	1,37,271	1,37,271
9. Projected PKM in 2000 AD (in millions)	2,79,209	3,19,842	3,56,356	4,67,459

Alternative I is based on observed past growth rate relationship between 1950-51 to 1977-78.  
Alternative II is based on assumed higher growth rate relationship higher than under I.  
Alternative III is based on observed past growth rate relationship between 1970-71 to 1977-78.  
Alternative IV is based on assumed higher growth rate relationship based on actual increase in the relation between 1960-61—1970-71 and 1970-71—1977-78. It is assumed that from now to 1999-2000, the ratio will again increase at this rate, viz., 39.7 percent for POP : POT and 50.8 percent for POP : PKM.

The total population in 2000 AD has been accepted as 885.5 million, as reported in 'Economic Situation and Prospects of India ; The World Bank, April, 1977.

Table 1.7

Estimated non-suburban passenger traffic  
(in billion kms.)

Year	Estimates on trend	Estimates based on regression
1977-78 (actual)	137	137
1982-83	160	146
1987-88	198	171
1992-93	249	200
2000-01	358	251

## 4.0. Components for non-suburban growth.

4.1. Non-Suburban traffic has two distinct components : one component is the short-distance or suburban-like traffic, moving on season tickets, which forms the bulk of the total, the other is the long-distance or inter-city non-suburban traffic. The rail-transport strategy for each has of necessity to be different. An attempt has been made to study the trend of growth of these two components both in terms of passengers originating and passenger kilometres from 1970-71 onwards.

4.2. These figures are indicated in Table 1.8

4.3. It is seen that the average annual growth rate over 1970-71 in terms of suburban-like traffic has been



12 per cent for originating passenger, and 35 per cent for passenger kilometres. For long distance traffic the growth rate has been 3.4 percent per annum for passengers originating and 7.6 percent for passenger kilometres. If the growth of non-suburban passenger traffic is studied, (without the 'suburban-like' traffic) which would constitute genuine long distance non, suburban traffic,

Table 1.8

**Trend of non-suburban originating passenger kilometres and the figures of originating passengers on season tickets with respective passenger kilometres.**

Year	Non-suburban passengers originating on season tickets (suburban-like traffic)	Non-suburban passenger traffic	
		No. of passengers (millions)	Passenger kilometres (billions)
1970-71	156.471	3.488	1,204 95.068
1971-72	181.339	4.053	1 261 125.328
1972-73	186.500	4.365	1,268 133.527
1973-74	189.186	4.690	1,216 107.626
1974-75	205.661	6.473	1,056 99.097
1975-76	305.540	10.413	1,306 115.899
1976-77	364.536	12.095	1,498 126.754
1977-78	379.849	13.103	1,575 137.201
1978-79	384.088	14.526	1,605 149.506
1979-80	344.943	14.472	1,602 159.927
1980-81	340.435	15.579	1,612 167.472
Percentage annual growth rate in 1980-81 over 1970-71.	11.75	34.6	3.38 7.6

it comes to 6.6 per cent in terms of passenger kilometres, as would be evident from Table 1.9 (page 10).

#### 5.0. Trends of future growth.

5.1. After studying all the above factors, it is evident that the passenger traffic will continue to grow substantially. If the computation for 2000 AD is based on the growth rate observed for the decade 1970-71 to 1980-81, the figures derived are as indicated in Table 1.10 (page 10).

Table 1.9

**Growth of hard-core non-suburban passenger traffic**

Year	Trend of non-suburban originating passenger kilometres (in billions)
1970-71	91.58
1980-81	151.89
Annual percentage growth in 1980-81 over 1970-71.	6.58

\* The reasons for this variation may also perhaps include changing social habits, loosening of family ties, increase in the cost

**Table 1.10**  
**Growth pattern for 2000 A.D.**

Non-suburban passenger traffic originating on season tickets		Non-suburban originating passenger	
Number of passengers (in millions)	Number of passenger kms. (in billions)	Number of passengers (in millions)	Number of passenger kms. (in billions)
1,100	118	2,647	409

5.2. If the base year for the non-suburban passenger traffic originating on season tickets, which has been growing at a rapid pace, is changed to 1975-76, as the jumps in this year from previous years was very substantial, this component of the non-suburban originating passenger traffic comes down sharply\* to a 40 billion for suburban, like traffic. This appears to the Committee to be more realistic.

5.3. RTEC have reckoned with the changes in the land use pattern aimed at arresting precipitate urbanisation. Escalation of land cost may also continue to affect this growth. It has to be pointed out that for total non, suburban traffic, RTEC have recommended 320 billion PKMs and NTPC 300 billion PKMs for 2000 A.D. RTEC have not commented upon the suburban-like traffic growth, which this Committee have computed at 40 billion PKMs, with an overall 320 billion PKMs. The estimate for non-suburban traffic is, therefore, placed at 280 billion PKMs.

5.4. The Committee realise that no figures can be considered as absolutely accurate. The aim is to arrive at an indicative figure, which should be authentic within an allowance of (+) (—) 15-20 per cent.

#### 6.0. Suburban traffic.

6.1. There is another component of passenger traffic commonly known as suburban traffic. In railway usage, suburban traffic is the traffic, which is confined to Bombay Calcutta and Madras metropolitan areas. Statistics do not, as yet, include even the traffic around Delhi in this category. The Committee had, therefore, to look at this figure based on the statistics available, i.e. for the three towns of Bombay, Calcutta and Madras. This component for other cities has already been discussed in the preceding paragraphs.

6.2. As already mentioned, RTEC have worked out the estimates on growth rate relationships between population and traffic. Three variants of population growth for the three cities were considered :

1. Future growth as in the 1970s for the three metropolitan towns. (For 1970-71 to 1977-78, it was 4.5 per cent for Bombay, 2.3 percent for Calcutta and 3.4 per cent for Madras).
2. Future growth based on urban growth of the country as a whole. (3 percent for 1971-83, 2.8 percent for 1983-88, 2.6 percent for 1988-93 and 2.4 per cent for 1993-2001, as estimated by the Planning Commission).
3. Future growth on changed land use patterns.

6.3. The estimates respectively under each of the above variants are 209 billion PKMs, 168 billion PKMs and 120 billion PKMs respectively. RTEC have recommended 168 billion PKMs for adoption.

of living and attempts at rationalisation of railway fares etc. These factors would continue to influence the growth in future.



6.4. NTPC have given the estimates as indicated in Table 1.11.

Table 1.11

## Suburban traffic (in billion PKMs)

Year	Estimates on trend analysis	Estimates based on regression
1977-78 (actual)	39	39
1982-83	50	49
1987-88	70	65
1992-93	97	85
2000-01	162	126

6.5. The Report of the Working Group on Railways for the Sixth Five Year Plan has indicated certain figures for 1984-85, the terminal year for the Plan. An attempt has, therefore, been made to adopt this figure as the base, and to calculate a range with the minimum being pegged at 10 per cent per annum and the maximum at 12 per cent per annum\*. The figures derived are indicated in Table 1.12 (page 13).

Table 1.12

## Growth Profile of suburban traffic.

Year	Percentage	Estimate of suburban traffic in passenger kms. (in billions)
1979-80 (base year)	..	38.730
1984-85	..	53.961
1989-90	10	77.449
	12	85.199
1994-99	10	96.822
	12	108.434
1999-2000	10	116.187
	12	131.669

\* The rationale for adopting 10 per cent and 12 per cent growth per annum is as follows :

1. RTEC estimates imply a growth rate of 11.8 per cent on 1976-77 base and 12.5 per cent on 1979-80 base.
2. NTPC estimates imply a growth rate of 13.5 per cent on 1977-78 base and 10.1 per cent on 1979-80 base.

6.6. The above figures indicate a range around 120 billion passenger kilometres for suburban traffic. This estimate tallies with the lowest forecast given by RTEC.

6.7. State Governments are seriously concerned about the continued urbanisation of the metropolitan cities and are devising measures to discourage the trend, in view of the burdens this imposes on civic services, law and order problems, ecology and sanitation. In some areas such as Bombay, new cities are being developed as counter-magnets. Similar action is being taken for Calcutta, Delhi, and Madras. Acceptance of a slightly lower profile of growth will, therefore, be justified, and in this context 120 billion passenger kilometres would appear to be a reasonable figure.

6.8. In order to study this problem in totality, the component of passengers travelling on season tickets now included on the non-suburban category has to be taken out and combined with this figure. In other words, 40 billion passenger kilometres, the estimate for 2000 A.D., should be added. The final figure for suburban traffic would thus become 160 billion passenger kilometres.

## 7.0. Freight Traffic :

7.1. A number of projections in respect of freight traffic, including those by RTEC and NTPC, have been available to the Committee. Acquaintance of various projections is given in Table 1.13 (page 15).

## 8.0. Five-year projection-slabs.

8.1. The traffic projections were computed by RTEC on five-year slabs commencing from 1982-83, the original terminal-year of the Sixth Plan. Projections are available for 1987-88 and 1992-93. On these bench marks, RTEC have calculated a profile of growth on five-year slabs. The Sixth Plan, however, now covers 1980 to 1985 and the bench marks have also changed.

8.2. Table 1.13 indicates that for 2000 A.D. the lowest forecast has been provided by RTEC and the highest by the Tata Economic Consultancy Services. These estimates vary widely but if RTEC's projections are compared with those of NTPC, the range would vary from 406 to 470 billion NTKMs for 2000 A.D.

8.3. RTEC's estimates are based on detailed studies of seven commodities, viz., foodgrains, coal, iron ore, iron & steel, cement, fertilizers and POL. These have been derived on the transport coefficient method. †

† The 'transport coefficient method' implies the determination of transport demand on a study of past trends of transport and total production. The assumptions about leads are conceptual.



<i>Sl No.</i>	<i>Name</i>	<i>Method</i>	<i>1982-83</i>	<i>1987-88</i>	<i>1992-93</i>	<i>1999-2000</i>
1.	Energy policy Working Group (EPWG)	Trend	200	240	300	410
2.	National Transport Policy Committee* (NTPC).	Regression analysis I	206	260	320	435
		II	216	272	335	455
		III	222	279	344	468
		IV	222	279	344	468
3.	Railway Corporate Plan, 1976	Elasticity Transport Coefficient	205-210@	235-240**	..	...
			..	..	..	600
4.	Tata Economic Consultancy Services (TECS).	Trend	1	..	..	250
		Traffic Coefficient	2	..	..	360
		Elasticity (income)	3	..	..	550
			4	..	..	970
						<i>Alternatives</i>
						I      II
5.	Operations Research Group (ORG)	Elasticity (scenatiros). A	-	-	..	485
		B	-	..	..	542
		C	..	..	..	860
		D	..	..	..	903
6.	Rail Tariff Enquiry Committee (RTEC)		195	247	295	406@@

8.5. While the bulk commodities have been studied by RTEC in depth, this was not done in respect of the growth in other goods traffic, except for a mention that the latter would increase from 46 to 55 and 60 million tonnes, by 1992-93 and 1999-2000 respectively. The Railways, as a transport mode, have certain inherent strengths as well as weaknesses. The Weakness of the railway system lies in its inability to provide a damage-free, fast, door-to-door service on a personalised basis. It has also difficulties in generally providing transport at the will of the consumer and of the type desired by him for small and piecemeal traffic. As against this, the basic strength of the Railways is in the carriage of bulk commodities or long distances. Road, which is the other important mode of transport, has inherent advantage in the movement of finished products, but not in the movement of bulk commodities. The Railways should, therefore, in future continue to exploit their strength of providing bulk transport in increasing measure and this would also effectively help economic development. At the same time, to help in the development of backward areas and small scale industries, for the carriage of expensive raw materials, for finished products, and to meet industrial demands, they have also to continue to provide transport for piecemeal traffic, but this is movement should be rationalised and reorganised and made more economic and efficient.

@@ Originating traffic is estimated at (in million tonnes) 298 in 1982-83, 381 in 1987-88, 478 in 1992-93 and 672 in 1999-2000.



8.6. The Railways have to change to a much larger extent than at present to the concept of moving a rake as the unit of movement vis-a-vis a wagon and develop commensurate facilities for mechanical handling at loading/unloading points, as a part of a multi-pronged strategy, so that they are able to cater to the projected quantum-jump satisfactorily, without the need to have a proportionate increase in the facilities. Movement of an ordinary four-wheeler wagon with marshalling from yard to yard and handling at terminals has obvious limitations on the quantum of traffic carried. By this, the Committee do not mean to recommend the elimination of wagon-load traffic, which specially in our conditions has also to be moved. The Committee have, therefore, later examined this aspect in greater detail and have made specific recommendations.

8.7. The Sixth Five Year Plan provides for 46 million tonnes of 'general goods' traffic in the terminal year. If the trend is studied for the last several years, a continuous decline in this traffic is observed, as is evident from Table 1.14

Table 1.14

**Trend of other goods traffic**

(Figures in million tonnes)

Year	Other goods traffic (revenue earning) (tonnes originating)
1969-70	34.3
1974-75	32.5
1977-78	31.9
1978-79	30.2
1979-80	29.3
1980-81	28.2

This decline is stated by some to be due to reluctance on the part of the Railways to carry such traffic with the resultant unreliability of such mode of transport. It is also to some extent because the Railways do not offer door-to-door service. However, as the Railways will continue to provide transport for non-bulk traffic also, it has been considered reasonable to peg this growth at one million tonnes per year till 2000 A.D.

**9.0. The lead factor.**

9.1. For a meaningful appreciation of the traffic projections, the implications of lead also need to be

studied. The lead becomes vital to the total transport effort reflected by net tonne kilometres.

9.2. On the Railways, the lead has been going up. In the absence of reliable data on future pattern of production, transportation and consumption of even important commodities, the Committee have calculated this on a conceptual estimation, on the following parameters, indicated by the current trends :

1. In respect of coal, outlying fields will produce more and contain the growth of leads around the present level.
2. For petroleum products, because of pipe-line replacement, the lead will come down.
3. Because of the establishment of a large number of plants in Western U.P., Punjab, Haryana and Rajasthan, the fertilizer industry will move closer to the consumption centres and the leads will come down. These fertilizer plants would be based on gas and would not require any major transportation of inputs by rail.
4. Cement leads will also come down because of large-scale expansion of the cement industry, particularly in Rajasthan and Andhra Pradesh, nearer to the consumption centres. Here, the main inputs of lime-stone would be carried by road for conveyors.
5. Leads in respect of iron ore, finished products and raw materials to steel plants may not substantially change in the total.
6. In respect of foodgrains, the leads will come down substantially with increasing self-sufficiency in the production of foodgrains achieved by a larger number of states, as also the capability of a larger number to export to neighbouring states.

9.3. Taking the figures for the Sixth Plan as 'given', the forecasting has been done in respect of originating tonnage, the lead and the tonne kilometres for five-year periods from the Sixth Plan onwards. This is indicated in Table 1.15.

9.4. The above information is summarised in Table 1.16.

9.5. This leads us to a forecast of the Railways requiring to move around 585 million tonnes in 2000 A.D., corresponding to a transport effort of the order of 375 billion net tonne kilometres. This is approximately 6 per cent lower than RTEC's estimate of 406 billion net tonne kilometres.



Table 1.15

Tonnage, lead and kilometrage\*

	Food grains	Coal	I & S	Raw material for Steel Plants	Pet. products	Cement	Fertilizers	Iron Ore	Rly. material (non-rev.)	Other Commodities	Total all commodities
<b>1984-85—</b>											
Lead	1,246	670	1,150	208	584	736	1,087	667	137	872	..
Prod.	149	167	11.1	..	45	36	..	37	..	..	..
Originating tonnage.	19	116.6	11	31.7	20	21.6	16	16	11	46	309
Tonne km.	23.6	78.2	12.8	6.6	11.7	13.9	17.4	10.6	15.07	40.1	230.6
<b>1989-90—</b>											
Lead	1,200	670	1,150	190	550	670	880	667	137	872	..
Prod.	175	245	..	..	56	..	..	..	..	..	..
Originating tonnage.	22.75	160	15	42	28	26.3	19	20.5	14	50	397
Tonne km.	27.3	107.2	17.2	7.9	15.4	17.4	16.7	13.7	19.2	43.6	271.16
<b>1994-95</b>											
Lead	1,100	670	1,150	190	500	600	800	667	145	872	..
Prod.	205	325	..	..	62.5	65.0	..	..	..	..	..
Originating tonnage.	26.65	215	18	50	31.0	39	24	25	27	55	500.65
Tonne km.	29.3	144	20.7	9.5	15.5	23.4	19.2	16.7	24.6	47.9	318.8
<b>1999-2000—</b>											
Lead	900	670	1,150	190	500	550	800	667	160	872	..
Prod.	230	375	..	..	70	73	..	..	..	..	..
Originating tonnage.	29.9	260	21	60	35	43	29	30	20	60	587.9
Tonne km.	26.9	174	24.1	11.4	17.5	23.6	23.2	20	3.2	52.3	375.0

Table 1.16

A Summary of Table 1.15

Tonnage, leads and kilometrage :

Year	Originating tonnage in millions	Lead in — Kms.	Tonne Kms. in billions
1984-85	309	711	230
1989-90	397	681	271
1994-95	500	635	318
1999-2000	588	635	375

## 10.0. Cushion in transport capacity.

10.1. That the development of transport capacity and infrastructure should be ahead of demand is uni-

versally accepted. In order to encourage growth in mining, agronomy and industry, the transport growth has necessarily to pre-empt the demand.

10.2. This implies that transport capacity should always have a cushion. The cushion has to provide normally for the peaking patterns as also for other indeterminate factors. The existing peaking pattern of traffic indicates a higher movement of about 10 percent during October-March as compared to April-September. However, for a long-term scenario, the Railways must endeavour 'to even out the peaking patterns to the extent practicable so that a uniform flow of movement throughout the year can be achieved. In this effort, all concerned Ministries, agronomy, mining and industry must come to the Railways assistance.

10.3. It would, however, be necessary to provide to the transport system a flexibility to take in its stride fluctuating waves of additional volumes of traffic generated by indigenous growth or exogenous bulk imports.

\* Lead in Kms. Production/Originating tonnage in million tonnes, and Tonne Kilometres in billions.



This will also cover a large number of other variables, which affect transport and which cannot always be anticipated, stored off or provided for with mathematical precision.

10.4. The Committee consider that a 10 percent resilience factor should be provided in rolling stock and ground capacity. The need-based projections have, therefore, been calculated after allowing a ten percent cushion. Table 1.17 gives the overall picture.

Table 1.17  
Cushion for resilience

	Originating tonnage (million tonnes)	Net tonne kilometres (billions)
Need-based	585	375
Need-based + 10%	644	413

10.5. The Committee thus consider that the range for 2000 A.D. would lie somewhere between 375 and 413 billion net tonne kilometres approximating to an originating tonnage of 585 to 644 million tonnes. The Committee would reiterate that planning should be for the higher figure, i.e. for 644 million tonnes and 413 billion net tonne kilometres.

#### 11.0. Quadrilateral-Diagonals Freight-Growth.

11.1. Formidable data gaps make attempts at precision in freight-estimation in the future extremely difficult. The difficulties arise from want of precise knowledge about future locational patterns of industries, dissipation centres, in respect of volumes, routes and areas, and rail transport zones of raw materials.

11.2. An attempt was made to compile information on origin-destination basis for 1989-90, but this was hardly complete or successful as the requisite statistical information was either not available, or available with such inadequate details as to cease to be useful. Beyond 1989-90, the data gap is wider.

11.3. Nevertheless, the Committee considered it necessary to make an attempt to quantify the totality of freight traffic likely to move on the 'quadrilateral' and the 'diagonal' routes to have an assessment of the transport effort likely to be generated on these main rail-transport arteries. This exercise also becomes essential because these are the intensively-used freight routes even today and form the backbone of not only freight, but also passenger traffic, and in the estimation of the Committee will continue to do so in the coming years.

#### 12.0. The arteries \*.

12.1. Around 75 percent of freight and 55 per cent of passenger traffic move over and across these routes, which constitute only around one-fourth of the network, and have over the years witnessed heavy investments in line capacity and are working to near saturation.

12.2. Table 1.18 summarises the total net tonne kilometres produced on these route.

\* The arteries are the routes that carry the preponderant share of freight and passenger traffic and include some routes besides the quadrilateral and the diagonals.

Table 1.18

#### Total NTKMs on the quadrilateral and the diagonals

(Figures in billions)

Year	NTKMs over quadri- lateral & diagonal routes	NTKMs over the entire Rail- way net- work	Percentage of (2) to (3)
1	2	3	4
1966-67	62.27	116.61	55.1
1970-71	75.19	127.36	59.0
1976-77	104.21	156.76	66.4
1979-80	92.82	155.995	59.5
1980-81	101.70	158.473	62.2

12.3. The route-wise details are given in Table 1.19 (page 25).

12.4. It is clear from Tables 1.18 and 1.19 that :

1. Upto 1976-77 (chosen by the Committee as watershed of economic development), traffic discharge has progressively been increasing, on the quadrilateral and the diagonals.
2. The entire incremental traffic in the total network was contributed by these routes upto 1976-77. This is of vital significance.
3. In 1979-80, there has been a decline in the total output on the quadrilateral/diagonals, but not commensurate with the drop in the total network. This is a reversal of the previous trend, the causes for which do not appear to be evident because there has been no radical change in locational and distributional patterns from 1976-77 onwards. The change, however, proved short-lived and was reversed next year.

12.5. The Committee have adopted the following parametres.†

1. No major shift will take place in locational pattern of heavy industries, which could result in drastic changes in traffic flows. This is understandable in the context of the continuing growth of urban areas as concentrations of consumer and even industrial growth, which have an easy access to the quadrilateral and diagonal routes.
2. The locational pattern in respect of power houses, fertilizer plants, cement plants, as are known today, will, by and large, remain unchanged in the next one or two decades.
3. Development elsewhere will not retard or slow down the development across the quadrilateral and diagonals.

† This is based on a general understanding of the denouement of the forces of economic development that India has already experienced and the projections for growth set before the country.



Table 1.19

Route-wise details of NTKMs (millions) to be moved on the quadrilateral-diagonals etc.

Sections	1966-67	1970-71	1976-77	1979-80	1980-81	Percentage growth per year			Projections in 1989-90		
						Over 66-67	Over 70-71	Over 76-77	Over 1966-67	Over 1970-71	Over 1976-77
1. Delhi-Bombay V.T.	10,110	12,154	15,548	15,001	18,881	6.2	5.5	5.3	29,399	28,321	27,944
2. Itarsi-Allahabad	3,139	3,212	3,686	3,832	3,866	1.7	2.0	1.2	4,440	4,594	4,291
3. Bombay V.T. Howrah.	7,263.5	8,541	11,972	9,964.5	13,772	5.8	6.1	3.8	20,936	21,360	18,427
4. Howrah-Delhi via Grand Chord.	18,907	20,659	30,550	24,236	23,717	2.1	1.5	...	28,220	26,871	23,717
5. Howrah-Delhi via main line.	3,006	2,628	3,006	3,029	3,249	0.4	2.4	1.5	3,388	3,941	3,687
6. Delhi-Bombay Central (W.R.)	7,154	8,468	10,293	12,665	13,609	6.04	6.0	8.0	21,007	20,659	23,407
7. Bombay V.T. Madras.	4,489.5	5,292.5	5,949.5	5,913	6,386.5	3.0	2.1	1.8	8,114	7,574	7,446
8. Delhi-Madras	2,664.5	3,504	6,095.5	6,570	7,805.2	13.8	12.3	7.0	17,485	16,430	12,738
9. Howrah-Madras	7,482.5	10,731	12,045	11,607	10,411.6	2.8	...	...	13,035	10,731	10,412
10. Others (MGS-LKO-ASR, DLI-BTI, DLI-UMB, KZJ-SC).	8,044	8,272	10,131	11,023	12,032	3.5	4.5	4.7	15,865	16,953	17,110
Grand Total	...	...	...	...	...	...	...	...	161,889	157,435	149,167

12.6. A two-fold strategy is possible for determining the total volume of transport output in the future economic growth profile :

1. If the trend of 1966-67 to 1976-77 is applied, the percentage should increase to 76 in 1986-87 and to 86 in 1996-97 of the total output of the network.
2. If the trend of 1979-80 is applied to the progressive increase as indicative of the pressure transferring the traffic to other streams, a value judgement is required on a macro level to reach a figure for 1989-90 and 1999-2000 for these routes.

### 13.0. Portents for future growth.

13.1. It is evident that development of railway capacity and infrastructure for the quadrilateral and the diagonals would continue to usurp to itself considerable importance and priority, and also that dispersal of substantial resources to the rest of the network would generally be on a lower scale not always justified by the needs of growth, but often-times also on socio-political grounds.

13.2. In order to further test this hypothesis, a study has been attempted of the growth of traffic on routes other than the quadrilateral and diagonals in terms of tonne kilometres produced. The routes so selected cover Mughalsarai-Lucknow-Amritsar, Delhi-Bhatinda, Delhi Ambala and Kazipet-Secunderabad, where *prima facie*, the existing movement pattern is indicative of heavy flows. These routes (combined) show a trend of marginal growth in the late Sixties, followed by increased growth in the Seventies and a

precipitate growth in 1980-81. This is evident from Table 1.20 (page 27).

Table 1.20

### Growth on other arterial routes

Routes	Net tonne kms. (in millions)				
	1966-67	1970-71	1976-77	1979-80	1980-81
Mughalsarai-Lucknow-Amritsar, Delhi-Bhatinda, Delhi-Ambala, Kazipet-Secunderabad.	8,044	8,272	10,131	11,023	12,032
Growth rate expressed as percentage over the previous base year mentioned above.	.	0.7	3.74	2.9	9.15

13.3. Attention is invited to Annexures A.1.1 to A.1.4 (pages 30 to 33). In Annexure A.1.3, the total coal movement in terms of million tonnes for 1989-90 has been converted into the number of trains calculated on the basis of the carrying capacity of 24 tonnes per wagon (4-wheeler) and a load equivalent to 72 four-wheelers. In other words, the number of trains have been derived with an average load of  $24 \times 72 = 1728$  tonnes of net load per train.\* In the second column in the same annexure, these have been reduced for 1989-90 in terms of heavier loads of 4500 tonne trains (including tare). For this purpose, it has been calculated that 55 BOX 'N' wagons will carry 55 tonnes per unit or in other words a net load of 3025 tonnes per train of 4500 gross tonnes.

\* The exercise made by the Committee has reckoned with the flows across the route even though they may or may not cover the entire route.



13.4. The movement of coal in terms of conventional operating practices would be very heavy on Delhi-Madras, Delhi-Bombay V.T., Itarsi-Allahabad and Howrah-Delhi routes. In respect of 4500 tonne trains also, the movement would be very substantial on Howrah-Delhi and Delhi-Madras routes, the latter being largely used for heavy movement of Singareni coal below Balharshah and some coal from Panch and Kanhan valleys, which will also flow partially along this route.

#### 14.0. Growth on the metre gauge.

14.1. The preponderant share of traffic would be moved on the broad gauge system. However, growth will also materialise on the metre gauge though not to the same extent as on the broad gauge. If the trend of the total net tonne kilometres on the metre gauge network is studied, it is found that the figure has varied from 18.6 billion in 1966-67 to 22.2 billion in 1976-77. Currently, the figure is about 20 billion net tonne kilometres.

14.2. A study has been made of the important routes on the metre gauge, which cover approximately 40 percent of the traffic on the metre gauge network and the results are given in Table 1.21.

Table 1.21

Route-wise details of NTKMs (millions)  
to be moved on selected M.G. routes.

Section	Projections in 1989-90 (NTKM in millions)
Delhi-Ahmedabad	2,864
Gandhidham-Palanpur	559
Bhildi-Degana	722
Degana-Rewari	351
Madras-Trichi-Tuticorin	680
Villipuram-Mayuram-Trichi	92
Gauhati-Lumding	317
Lumding-Tinsukia	474

#### Section

Projections in  
1989-90  
(NTKM in  
millions)

Purna-Secunderabad	553
Secunderabad-Guntakal	613

Details are given in Annexure A-1.4

#### 15.0. Conclusions.

15.1. It has been estimated that by the end of the century, the growth in rail-borne freight movement will be to 413 billion NTKMs. Similarly, substantial growth is expected in the development of rail-borne passenger traffic, viz., 280 billion PKMs for non-suburban and 160 billion PKMs for suburban traffic.

15.2. The growth of freight and passenger business on the quadrilateral and the diagonal routes would be considerably heavier than in other areas. These routes would, therefore, require substantial investments by way of line capacity order in to be able to move the fast growing traffic.

15.3. The estimate of growth, in respect of both passenger and freight traffic, as worked out in the foregoing paragraphs, shows the tasks ahead for the Railways and the Government. One way of tackling this growth is by taking ad hoc measure, from year to year, and from one annual plan to another by handling the situation as it arises in the best way possible 'under the circumstances'. This certainly is not a scientific or satisfactory approach, and in such a management-endeavour the results would be fortuitous and erratic and the time factor will be a heavy handicap. The other and more correct approach would be to plan for augmentation of capacity on these routes, in a well thought-out manner and on a format plan for 'an integrated systems growth.'

15.4. The Committee are convinced that it is essential to take a hard look at this profile of growth in order to develop an appropriate strategy for catering to the transport-needs of the mounting estimated economic growth in a co-ordinated, consolidated, integrated and planned manner.

ANNEXURE A-1.1  
(Cf. para 13.3)

Coal movement by rail ex-coal fields to power houses and other consumers (in million tonnes) alongwith number of trains per day in 1987-88.

Section	Mugma		Raniganj		Jhuria		South Karanpura		North Karanpura		East & West Bokaro		Giridih	
	PH*	NPH†	PH	NPH	PH	NPH	PH	NPH	PH	NPH	PH	NPH	PH	NPH
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Delhi-Bombay V.T.	...	...	...	...	...	...	0.19	...	...	...	...	...	...	...
2. Itarsi-Allahabad	...	...	...	...	...	...	...	...	...	...	...	...	...	...
3. Bombay V.T.-Howrah	...	...	...	...	...	...	...	...	0.62	...	...	...	...	...
4. Bombay V.T.-Madras	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5. Delhi-Madras	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6. Howrah-Madras	...	...	4.34	...	1.5	...	...	...	...	...	...	1.50	...	...
7. (a) Howrah-Delhi Grand Chord.	0.50	2.0	7.22	13.62	4.0	4.0	0.74	2.68	6.58	10.04	2.30	...	...	0.1
(b) Howrah-Amritsar Grand Chord.	...	...	...	5.38	...	...	...	1.78	...	0.69	...	...	...	0.0
8. Howrah-Delhi Main Line	...	...	...	...	...	...	...	...	...	...	...	...	0.50	...
9. Delhi Bombay Central (WR).	...	...	...	1.5	...	...	...	...	...	...	...	...	...	...
Total coal (million tonnes)	0.50	2.0	11.56	20.5	5.5	4.0	0.93	4.46	7.20	1.73	2.30	1.50	0.50	0.11

\* Coal for Power Houses.

† Coal for other consumers (non-Power Houses).



**ANNEXURE A-1.2**  
(Cf. para 13.3.)

**Coal movement by rail ex. coal fields to power houses and other consumers (in million tonnes) alongwith number of trains per day in 1989-90.**

Section	Talcher		Singrauli		CIC		Korba lb valley		Pench Kanha		Wardha	
	PH	NPH	PH	NPH	PH	NPH	PH	NPH	PH	N	PH	NPH
	8		9		10		11		12		13	
1. Delhi-Bombay VT	...	...	12.0	...	3.0	2.8	...	...	1.13	.23	1.2	1.2
2. Itarsi-Allahabad	...	...	12.0	...	...	...	...	...	...	...	...	...
3. Bombay VT-Howrah	...	...	...	...	...	...	6.60	1.5	...	...	...	...
4. Bombay VT-Madras	...	...	...	...	...	...	...	...	...	...	...	...
5. Delhi-Madras	...	...	...	...	...	...	...	...	1.13	...	...	...
6. Howrah-Madras	3.5	1.0	...	...	...	...	...	2.5	...	.58Dn. .08UP	...	...
7. (a) Howrah-Delhi Grand Chord.	...	...	...	...	...	...	...	...	...	...	...	...
(b) Howrah-Amritsar Grand Chord.	...	...	...	...	...	...	...	...	...	...	...	...
8. Howrah-Delhi Main Line	...	...	...	...	...	...	...	...	...	...	...	...
9. Delhi-Bombay (WR)	...	...	...	...	...	11.8	...	...	0.85	0.35	...	...
Total (million tonnes)	3.5	1.0	24.0	...	3.0	14.6	6.60	4.0	3.11	1.24	1.2	1.2

Section	Pather Kheda		Singareni		Kamptee & umrer		Total coal		G. Total
	PH	NPH	PH	NPH	PH	NPH	PH	PNH	
	14		15		16		17		18
1. Delhi-Bombay VT	...	...	...	...	1.41	18.93	4.23	...	23.16
2. Itarsi-Allahabad	...	...	...	...	...	12.0	...	...	12.0
3. Bombay VT-Howrah	...	...	...	...	...	...	1.50	...	8.72
4. Bombay VT-Madras	...	...	...	...	...	7.22	...	...	...
5. Delhi-Madras	5.03	18.0	...	...	0.22	6.16	18.22	...	24.38
6. Howrah-Madras	...	...	...	...	...	9.34	5.64	...	14.98
7. (a) Howrah-Delhi Grand Chord.	...	...	...	...	...	21.34	23.47	...	44.81
(b) Howrah-Amritsar Grand Chord.	...	...	...	...	...	...	7.90	...	7.90
8. Howrah-Delhi Main Line	...	...	...	...	...	0.50	...	...	0.50
9. Delhi-Bombay (WR)	...	...	...	...	...	2.35	13.65	...	16.00
Total (million tonnes)	5.03	18.0	...	1.41	0.22	77.84	74.61	...	152.45

**ANNEXURE A-1.3**  
(Cf. para 13.3 )

**Coal movement by rail ex. coal fields to power houses and other consumers (in million tonnes) alongwith number of trains per day in 1989-90.**

Sections	Total number of goods trains		
	In terms of 72F/W in 1989-90*	In BOX 'N' (4500 Tns.) in 1989-90	Actually ran in 1979-80 (including pilots)
	19	20	21
1. Delhi-Bombay VT	36.8	21.0	31.0
2. Itarsi-Allahabad	19.0	10.9	20.2
3. Bombay VT-Howrah	13.6	7.8	23.7
4. Bombay VT-Madras	...	...	15.3
5. Delhi-Madras	38.7	22.1	21.7
6. Howrah-Madras	23.8	13.6	22.5
7. (a) Howrah-Delhi Grand Chord	71.4	40.5	...
(b) Howrah-Amritsar	12.5	7.2	53.4
8. Howrah-Delhi Main Line	0.8	0.45	18.9
9. Delhi-Bombay Central (WR)	25.4	14.5	32.4

\* Excludes pilots.



## ANNEXURE A-1.4

(Cf. para 4.2)

## Route-wise details of NTKMs (millions) to be moved on busy M.G. sections on Indian Railways.

Sections	1966-67	1970-71	1976-77	1979-80	1880-81	Percentage growth per year over			Protections in 1989-90 over		
						1966-67	1970-71	1976-77	1966-67	1970-71	1976-77
Delhi-Ahmedabad	1,936	2,448	2,755	2,496	2,501	2.08	0.19	(—)0.55	2,864	2,544	2,501
Gandhidham-Palanpur	785	438	460	501	559	(—)2.05	2.51	4.36	559	658	737
Bhildi-Degana	614	497	533	702	680	0.77	3.34	1.76	722	830	944
Degana-Rewari	208	194	263	419	295	2.98	4.73	2.43	351	378	353
Madras-Trichi-Tuticorin	781	839	904	711	680	(—)0.92	(—)1.72	(—)4.96	680	680	680
Villapuram-Mayuram-Trichi	154	92	119	78	92	(—)40.25	...	(—)22.68	92	92	92
Gauhati-Lumding	472	339	478	373	317	(—)2.34	(—)0.59	(—)6.73	317	317	317
Lumding-Tinsukia	354	467	607	471	427	1.47	(—)0.77	(—)5.93	474	427	427
Purna-Secunderabad	162	301	369	444	400	10.49	2.96	1.68	553	481	456
Secunderabad-Guntakal	283	419	544	499	484	5.07	1.41	(—)2.2	613	537	484





## CHAPTER II

### TRANSPORT PLANNING

#### 1.0. Introduction.

1.1. Coordinated Railway planning began to take shape with the formulation of the First Five Year Plan in 1951.

1.2. A Planning Directorate was set up in the Railway Board in 1956. It basically performs two types of functions: firstly, it coordinates with the General Managers, other Directorates in the Railway Board and the user Ministries in assessing the rail transport requirements; secondly, it undertakes the scrutiny and assessment of inputs required for increased rail transport capacity and other investments. In effect, it has the responsibility of helping the Board in the estimation, programming and apportionment of investments under the different plan heads.\*

1.3. Planning process on the Railways has all along been conceptually a central activity. This is reflected not only in the inadequacy of data base on which planning decisions are taken at the highest level, about which the Committee will deal with later, but also in the lack of full interface with the grassroot level.

1.4. In the three decades of planning experience available to us, no major institutional changes appear to have been made in the planning process. However, in 1972 the Railways initiated themselves into evolving a Corporate Plan, covering a 15-year horizon. This clearly was a step forward.

#### 2.0. Railway Five Year Plans: a review.

2.1. It will be useful to have a brief over-view of the important features of the various Five Year Plans.

2.1.1. The First Plan (1951-56) was a rehabilitation/modernisation plan for rolling stock and fixed assets, alongwith the creation of some additional capacity to cater to growth. It also provided for better amenities to travelling public and better housing and welfare to the employees.

2.1.2. The Second Plan (1956-61) had aimed at moving the incremental traffic, rehabilitation of track, bridges and rolling stock, and working for self-sufficiency in railway equipment.

2.1.3. The Third Plan (1961-66) also provided for additional capacity to meet the traffic demands, improvements and modernisation in designs and efficiency of rolling stock by increasing use of modern techniques and updated equipment.

2.1.4. The Third Plan was followed by three inter-plan years. The emphasis shifted to completion of on-going schemes, quick-yielding schemes and the optimum utilisation of the already created capacity.

2.1.5. The Fourth Plan (1969-74) programmed to provide fully for freight and coaching traffic, to further modernise the equipment and practices so as to improve efficiency, and to accelerate the pace of gauge conversion.

2.1.6. The Fifth Plan (1974-78) again programmed to provide capacity for incremental freight and passenger traffic with flexibility to meet sudden changes, to continue efforts to modernise the system, to assist in the development of backward areas, to achieve self-sufficiency in equipment by undertaking production of critical items, to maintain financial viability of the Railways and to develop a higher standard of research and development.

2.1.7. The Sixth Plan (1980-85) provides for optimisation of efficiency by increasing the output of the existing assets, to plan for short distance and even medium distance piecemeal traffic for being moved by road transport, to achieve a high degree of inter-modal coordination by going in for commodity-dumps such as coal, steel, fertilizers, etc. and the creation of adequate railway terminal facilities.

2.2. The striking feature about our planning objectives is their broad sweep. The objectives have been ambitious and somewhat idealistic, but also rather diffused and pervasive, and therefore, did not lay the requisite emphasis on the vital objective of adequately meeting the freight and passenger transport demands, though the idea came up here and there as a refrain. In this context, it should be noted that during the Five Year Plans, the Railways have not been able to match, with the demand, the supply of transport, both freight and passenger, except for occasional patches of complete demand-satisfaction.

#### 3.0. A scrutiny.

3.1. A scrutiny of the planning process should concern itself with the fulfilment of the essential objectives. It must also deal with the following three aspects :

1. Determination of rail transport capacity.
2. Whether all investment on the Railways generate capacity.
3. Investment on the Railways.

3.2. The Committee have noted that the Railways have not been attuned to 'the spirit of modernisation'. This is reflected in the inability to modernise/update the technology, equipment, machinery and plant or the methods employed for their maintenance or creation of facilities, as an inbuilt process of development. This is inhibiting the achievement of results and has prompted the system to make do with 'what exists or can be done,

\* The plan heads, are : Rolling Stock, Workshops & Sheds, Machinery & Plant, Track Renewals, Bridge Works, Traffic Facilities, Signalling & Telecommunications, Electrification, Other Electrical Works, New Lines, Staff Welfare, Staff Quar-

ters, Users' Amenities, Other Specified Works, Inventories, Investment in Road Services, Metropolitan Transport Projects. Research & Development is, however, non-plan expenditure.



#### 4.0. Determination of rail transport capacity.

4.1. Rail transport capacity can be quantified on certain assumptions and within certain parameters. This can then be correlated with the actual achievements to determine the extent of failure or success. This will also clarify whether the Railways have the capacity to meet the demands of freight and passenger transport, and why they are not able to achieve it.

4.2. A distinction is necessary between the capacity generated by rolling stock and by line capacity works. While the former is transferable, the latter is not. For instance, if on a certain route, capacity exists for running X number of trains and due to whatever reasons, only percent is utilised, it is not possible to use this capacity in another area where the ground capacity may be 50 per cent less than the requirements. Another important factor about the ground capacity is that it has to be created 'in lumps' and yet another is that it can not be physically transferred from one section or route to another.

This implies that capacity-creation at certain levels exceed the requirement.\*

4.3. The quantification of capacity of rolling stock is possible on the basis of certain assumptions related to efficiency parameters for achieving optimum usage of assets. The existing methodology followed by the Railways for calculation of rolling stock capacity<sup>@</sup> is to separately calculate the capacity for wagons and locos on an all India basis. In the case of wagons, the following two methods are applied:

1. Turn-round method.
2. Net tonne kilometres method.

4.3.1. For locos, only the NTKM method is applied.

4.3.2. The two methods have been briefly explained in Annexure A. 2.1. The first method appears to be more reliable. The Annexure appears at pages 91-92.

4.4. Table 2.1 indicates the anticipated and actual originating tonnage, tonne kilometres and the leads.

Table 2.1  
Freight traffic

Plan period	Originating tonnage in the terminal year (in millions)		Tonne Kms. in the terminal year in billions)		Lead in the terminal year (in kms.)	
	Anticipated	Actual	Anticipated	Actual	Anticipated	Actual
First	120	115.8	N.A.	59.6	N.A.	510
Second	164.5	156.2	N.A.	87.7	N.A.	561
Third	241.3	203	N.A.	116.7	N.A.	576
Inter						
1766-67	216.0	201.6	N.A.	116.6	N.A.	578
1967-68	210.2	196.6	N.A.	118.6	N.A.	605
1768-69	204.0	203.0	N.A.	125.1	N.A.	613
Fourth	235.0	185.8	148	122.4	630	662
1769-74						
Fifth	250.0†	223.4	169.5†	154.8	678†	693
1974-78						

\* For example, while patch doubling may permit X number of trains to be run, the entire doubling may have to be resorted to for running X×1 trains. At the same time, the entire doubling may create a capacity of running X×Y trains, Y being greater than one.

@ The method of calculation for wagon on line, (average number

#### 5.0. An appraisal.

5.1. Table 2.1 indicates that till the Fourth Plan, the Plan documents do not mention leads and tonne kilometres. The anticipations during the first two Plans were, by and large, fully met. During the Third Plan, the anticipations were not realised, and there was a big surplus because of non-materialisation of traffic particularly from the collieries and the steel plants. The anticipations were nearly fulfilled in 1968-69. It is relevant to know why anticipations came down drastically during the Inter Plan years (1966-69). This is perhaps explained by the increasing volume of transport produced in terms of tonne kilometres. In fact, if the Third Plan lead of 576 Kms. would have remained constant and not increased to 613 Kms. in 1968-69, the Railways could have leaded 218 million tonnes of traffic.

5.2. The picture, however, changes from the Fourth Plan onwards when there is a shortfall in respect of both NTKM and originating tonnage. Same is the case for the Fifth Plan; taking 1978-79 as the terminal year as originally envisaged for the Fifth Plan, there is a shortfall of 37 million tonnes from the target in originating tonnage and 15 billion in NTKMs. It is, therefore, necessary to examine this trend in some detail.

5.3. Generally speaking, variations can be explained by the different acquisitions of physical assets, particularly wagons and locomotives. The point is well illustrated by the current Sixth Plan, which is silent on the passenger traffic growth because of the apparent realisation that no new trains can be introduced for want of adequate coaches. In fact the Plan does not provide for production of coaches on 'additional' account†. Ordinarily these should be correlated with the ground-capacity investment. Table 2.2 gives the general picture of the acquisition of physical assets from the First to the Fifth Plans

Table 2.2

#### Procurement of rolling stock

Plan	Locos		Wagons		Coaches/EMUs	
	Planned	Acquired	Planned	Acquired	Planned	Acquired
First	1,038	1,586	49,148	61,254	5,674	4,759
Second	2,258	2,092	107,247	97,954	11,364	7,718
Third	2,070	1,864	157,246	144,789	8,601	8,019
Inter	905	877	73,356	55,317	4,483	3,795
Fourth	1,032	934	68,776	57,608	7,291	6,585
Fifth	1,111	650	62,000	46,979	7,554	4,120

5.4. In the Fourth Plan, the acquisition in terms of locos and wagons in relation to the procurement target was as indicated in Table 2.3.

of wagons on line) is defined on page 95 of the Manual of Statistical Instructions Volume I, 1972.

† These targets were for the terminal year i.e. 78-79.

‡ Production on 'additional account' means production of new units and not in replacement.



Table 2.3  
Procurement in the Fourth Plan

Item	Procurement target	Actual procurement	Shortfall	
			In Nos.	In %age
Locomotives.—				
1. Electric	300	206	94	31
2. Diesel	708	597	111	16
Wagons.—				
(in terms of four-wheelers).	68,776	57,608	11,168	16

5.5. Evidently, therefore, the capacity in terms of locos and wagons was not adequately created. The capacity adopted on a turn-round of 12.1 days for B.G. and 9.6 days for M.G. was worked out as 221 million tonnes, with an average lead of 670 Kms. by the turn-round method. By the NTKM method, adopting 943 NTKMs, per wagon day for B.G. and 522 for M.G., the best performance during the previous 10 years, the capacity came to 220 million tonnes with a lead of 678 Kms. In other words, the Fourth Plan end could be taken as having generated a capacity of about 220 million tonnes of traffic in terms of originating tonnage and 150 billion NTKMs in terms of total volume. As against this, 1973-74 performance was vitiated by serious labour unrest.

5.6. The Fifth Plan requirements for its final year had been worked out by the Railways for a carriage of 250 million tonnes of freight traffic, with a lead of 678 Kms. or for producing a total volume of transport of 169.5 billion NTKMs. In addition, planning was done for 17 per cent higher non-suburban and 25 per cent higher suburban passenger traffic. For this effort, the Railways had calculated the requirements in the way shown in Table 2.4.

Table 2.4  
Railways' computation of rolling stock for 1978-79

Item	Need-based requirements of Railways, corresponding to freight target of 250 mt.	Requirements worked out by the Railways taking into account limitations of production capacity/under DRF	Provision agreed to by the Planning Commission	Actual procurement
Locomotives	1,111	963	888	650
Coaches EMUs.	7,554	5,650	5,222	4,120
Wagon (in 4-wheelers).	62,000	54,000	54,000	46,979

\* The various figures of NTKMs per wagon day on the broad gauge and metre gauge are based on the Report of the Working Group on Railways for the Sixth Five Year Plan, set up by the

5.7. The calculation was based on turn-round figure on 12.1 days for the B.G. and 10.5 days for the M.G. It would be seen that there was a substantial shortfall in the provision made for locomotives, coaches and EMUs. While the wagon requirements were agreed to by the Planning Commission as estimated by the Railways, evidently there was a shortfall of 8,000 wagons in relation to the need-based requirement. Clearly the Railways had fallen into the practice of carrying worn-out stock on their system because of limitations under DRF, thus affecting productivity, a practice which has proved costly. It is also necessary to comment on the fact that the actual procurement was less than even the lower agreed figures of the Planning Commission. Thus two types of shortages got built in, firstly because of the Railways' non-insistence on providing for full replacements, and secondly because of their failure to acquire what was agreed. It must, however, be appreciated that as the plans did not provide inflationary effect, the Railways could not have physically acquired the assets planned and to that extent, their planning process is not wholly to blame.

5.8. The Sixth Plan provides for acquisition of one lakh wagons in terms of four-wheelers. The holding at the beginning of the Sixth Plan in terms of wagons in four-wheelers was 4,18,964 on B.G. and 1,15,552 on M.G. Of the one lakh wagons expected to be procured during the Sixth Plan, it has been assumed that the net addition on the B.G. would be of 66,000 wagons. In other words the holding as on 31, March 1985 would be 4,84,964 wagons. Some wagons would still be carried on the system which would not give optimal results, and would have the tendency of bringing down productivity. It is assumed that the fleet would produce the following NTKM :—

Alternative I	A norm of 950* NTKMs on the B.G. and 540 on the M.G.
Alternative II	A norm of 1012* NTKM on the B.G. and 540 on the M.G.
Alternative III	A norm of 1045* NTKMs on the B.G. and 570 on the M.G. (which is the best performance in 1980-81).

5.8.1. Table 2.5 indicates the capacity in terms of originating traffic on various leads on the basis of the above norms.

Table 2.5  
Capacity in terms of originating traffic.

As on 31 March	Lead in Kms.	Norms in terms of NTKMs per wagon day on B.G./M.G.		
		Alt. I 950/540	Alt. II 1012/540	Alt. III 1045/570
1978	678	224.3	236.9	245.3
	693	219.5	231.7	240.0
	718	211.8	223.7	231.66
1980	678	228.0	241.1	250.0
	693	223.1	235.9	245.0
	718	215.3	227.7	236.4
1985	678	258.9	273.8	283.46
	693	253.3	267.9	277.33
	718	244.5	258.5	267.67

Planning Commissions The Group calculated the requirement based on these figures



5.8.2. If this capacity is studied on the wagon turn-round method on the Fifth Plan norms and the 1978-79 norms, the following picture emerges respectively:

Table 2.6  
Capacity computed on turn-round

Capacity as on 31 March	Scenario I (Fifth Plan norms).	Scenario II (1978-83 norms).
1978	253.8	251.08
1980	257.9	255.21
1985	292.6	289.7

5.8.3. The Fifth Plan norms provided for a turn-round of 12.1 days on B.G. and 10.5 days on M.G. These have not been achieved during 1970s. Even during the Sixth Plan, the Railways on the best-usage norms will not have capacity adequate for 309 m.t. mentioned in the Sixth Plan Document. This highlights the need for Planning on more realistic assumptions for the future, and more importantly to achieve what is planned.

#### 6.0. Lead of traffic.

6.1. The capacity has an intimate relationship with leads. †Table 2.7 indicates how steadily leads have been moving upwards. In these calculations, the behaviour of leads on capacity is evident.

Table 2.7  
Leads of traffic

Year	Lead in Kms.			
	B.G.	M.G.	N.G.	All Railways.
1950-51**	387	221	83	346
1960-61	570	316	85	561
1965-66	556	368	86	576
1969-70	585	409	92	617
1973-74	630	462	94	662
1977-78	659	473	93	686
1980-81	695	544	80	720

6.1.1. The overall leads have consistently been rising. This certainly impinges on the accepted efficiency norms for wagons. This also explains fluctuations in originating tonnage, as seen in Table 2.1§, when the total transport output, as seen by NTKMs, has kept on increasing steadily.

6.1.2. The capacity of the railway network as adjudged by the efficient norms of wagons/locos has necessarily to be related to the productivity of the system. On the other hand, the general climate of discipline and the external environment which affect productivity, make performance-comparison between the 1960s and the 1970s unequal due to change in the environment and

the fall in discipline. The cyclical rise and fall in productivity, depending upon the relative degree of discipline has, therefore to be considered. The Fourth Plan synchronises with a period of rising indiscipline, which vitiated productivity. In fact, it is the discipline which should be listed as one of the important factors for the decline in performance. The Fifth Plan also suffered from the same malady, but with greater enforcement of discipline during 1976-77 performance greatly improved, and the trend saw through 1977-78 as an impact of the momentum. Again there was a decline. With better discipline, and larger outlays to enable the Railways to build up adequate capacity to meet the demand, performance can be optimised. It is in any case important to generate capacity in the national railway network which should invariably be a head of the demand.

#### 7.0. Whether all investments on the Railways generate capacity.

7.1. The investment on the Railways is done through several plan heads. These plan heads not only include rolling stock and line capacity works which enhance the capacity of the system, but also activities which do not result in creation of additional capacity, e.g. expenditure on replacement and renewal (excluding the improvement-element), staff quarters, labour welfare works, users amenities etc.‡

7.2. A statement is attached as Annexure A.2.2 (page 93), indicating the planned expenditure incurred for generation of additional carrying capacity. This is primarily based on the existing methodology of investment and the existing plan-heads. It would be seen that of the total plan expenditure, the expenditure on capacity generation has varied from 50 to 66 per cent. In recent years, it has been in the vicinity of 59 per cent.

7.3. Thus, only 60 per cent of the total plan expenditure goes towards generation of capacity (both freight and passenger).

#### 8.0. Share of investment on the Railways to the total plan.

8.1. The Railways provide one of the main infrastructural supports for ushering in economic resurgence and industrial progress. On a macro level, therefore, it becomes necessary to study the trend of the share of investment allocated to the Railways in the plan periods. Table 2.8 indicates the growth pattern of traffic and investments on the rail system from 1951 to 1979.

Table 2.8  
Percentage growth rate

Plan	Period	Investment		Traffic	
		At constant prices in 1950-51		Freight Kms.(+)	Passenger Kms.
First	1951-56	2.0		2.1	
Second	1956-61	6.0		6.3	
Third	1961-66	6.6		5.2	
Inter	1966-69	3.0		2.9	
Fourth	1969-74	2.3		2.2	
Fifth	1974-79@	1.0		6.9	

\*\* The figures for 1950-51 relate only to the State Railways.

† All Railways' leads are calculated by taking into account the total tonne kilometres of all gauges and dividing it by tonne originating. § Page 38

‡ It is not the intention here to comment on the merits of such

investments, but to underline the fact that they do not generate capacity.

@It may be mentioned here that Fifth Plan was terminated by the end of 1978. The figures of investment and traffic in the last two columns however are for the period 1974-79.



8.1.1. The table indicates that investment has been steadily declining and has failed to keep pace with traffic growth, thus creating an imbalance, which has proved costly to the economy.

8.1.2. Table 2.9 indicates the investment in Railway sector, as proportionate to the overall investment in the national plan (public sector), and of investment in the transport sector.

Table 2.9

**Railway in the total planning profile**

Plan		Outlay on Railway Plans as percentages of out- lay on	
		National Plan	Transport Sector
First	1951-56	11.23	46.77
Second	1956-61	18.68	66.91
Third	1961-66	11.86	59.89
Inter	1966-67	10.78	52.57
	1967-68	8.66	46.56
	1968-69	7.34	40.37
Fourth	1969-74	6.60	32.42
Fifth	1974-79	5.60	32.00
Sixth	Proposed	5.23	32.59

8.1.3. Table 2.9 also indicates the mis-matching of investments. The details are indicated in Annexure A. 2.3.

8.1.4. At the time of formulating the Sixth Plan, the Railways stated that as against the transport demand of 309 million tonnes of originating traffic in the terminal year, even on the best efficiency norms since achieved, they would not be able to carry more than 270 to 280 million tonnes with the wherewithal available and being provided for. This is also borne out by calculations given earlier. It is evident that even in the Sixth Plan, the investment is not likely to be adequate to match the demands on the system in respect of either passenger or freight traffic.

8.2. The experience leads one to conclude that the capacity has been allowed to be overtaken by the demand. In the Planning for the Sixth Plan, shortages are not being overtaken, and in many areas are being allowed, for whatever reasons, to pile up. Whereas the world over, it is a recognised principle that transportation capacity proceeds and not follows the demand therefore, this principle is not being observed in India. This is a pity.

8.2.1. Rail transport planning has to provide for certain types of 'surges'. There is a peaking pattern of about 10 to 15 per cent, as observed from the loadings during October to March as compared with the remaining months. Table 2.10 (page 50) indicates the performance for the last few years.

Table 2.10

**Average loading (originating on Indian Railways during 1979-80, 1980-81 & 1981-82 (in terms of 4 wheelers)**

	Peaking pattern		
	79-80	80-81	81-82
<b>Broad Gauge.—</b>			
April-September	22,460	22,043	25,174
October-March	23,906	24,979	27,495
Percentage increase	6.44	13.32	9.22
<b>Metre Gauge.—</b>			
April-September	4,972	4,396	4,610
December-March	5,362	5,227	5,519
Percentage increase	7.84	18.90	19.72

8.2.2. Such peaking should prove only to be temporary, and in the long run it should be possible to achieve uniformity in loading round the year. This should be possible by the strategies enumerated for the movement of bulk commodities by the establishment of nodal points and arranging block rake movement. For certain commodities such as foodgrains, it would require sufficient storage capacity being developed in the production areas, as also in the areas of dissipation, and for this storage godowns and silos would need to be set up. For other commodities, such as coal, it would be possible to do so if the production during the winter months is sufficient to meet the requirements on a sustained basis during the lean summer and monsoon months. This implies that however difficult it may be in the next decade or so, the pithead stocks should be allowed to go up substantially during the winter so that loading could be evened out round the year to the maximum extent possible.

8.2.3. Over and above the peaking pattern discussed in the preceding paragraphs, there is necessity for providing a cushion in the transport capacity to overcome a large number of indeterminate factors, which affect the transport situation. For this purpose, a 10 per cent surplus capacity is suggested. This should cover both ground capacity and rolling stock separately. Injection of such resilience to the system should be consciously planned.

8.3. The traffic increase on the Railways for the year 2000 A.D. has been estimated in the first chapter as being of the order of three-fold level for freight and two-fold level for passenger traffic. This task cannot be accomplished without channelisation of sufficient investments into the system from right now. The Sixth Plan, even with relatively increased outlays, is likely to fail substantially in taking the system ahead in terms of capacity vis-a-vis demand.

8.4. The inability of the Railways to fully use the funds allocated has frequently been mentioned. In the First Five Year Plan, which was primarily a rehabilitation plan, the Railways, by and large, spent the allocated sum, but there was a marginal shortfall under the heads



'Rolling Stock' and 'Machinery & Plants'. There was a slight excess in 'Track Renewals'. In the Second Five Year Plan, the Railways utilised almost 30 percent of the outlay under the head 'Machinery & Plants' and 'Workshops and Sheds'. They also marginally failed to make full use of the allocations under 'Rolling Stock'. However, the expenditure on 'Track Renewals' was substantially more than the approved outlay. In the Third Five Year Plan, the Railways again failed to fully utilise the allocations under 'Rolling Stock', 'Machinery & Plants', 'Electrification', etc. However, substantially more than the allocations on 'Track Renewals', 'Traffic Facilities' and 'Workshops & Sheds' was spent. It may be clarified that, as discussed in the previous paragraphs, the Railways developed a surplus capacity in the Third Plan. Therefore, while there could be some justification for their not adding to the rolling stock fleet, the failure to utilise the outlays fully for 'Machinery & Plant'—vital for maintenance—was not justified.

8.4.1. In the Inter Plan years, the Railways again failed to utilise the outlays fully for 'Rolling Stock', 'Machinery & Plant', 'Track Renewals', 'Workshops & Sheds', and even 'Electrification' and 'Traffic Facilities'. In fact, as far as the arrears of track renewals are concerned, these arrears started building up from the inter-plan years. Had the moneys been utilised fully during these periods, i.e., the Third Plan and the Inter Plan years, it would have been possible to nip the tendency in the bud. The Fourth Plan again shows the failure of the Railways to utilise outlays on 'Track Renewals', 'Machinery & Plant' and 'Workshops & Sheds' fully. Evidently, the Railways had fallen into the habit of neglecting the maintenance aspects, as sufficient attention was not devoted to spend the sums on these heads fully.

8.4.2. In the Fifth Five Year Plan, which was terminated a year in advance, the detailed expenditure under various plan-heads alongwith the outlay allocated from year to year is indicated in Table 2.11.

Table 2.11

Total outlay and expenditure during the Fifth Plan  
(1974-75 to 1977-78)

(Rs. in crores)

Plan-heads	Outlay for four years	Actual Expenditure
Rolling Stock	802.57	793.91
Machinery & Plants	31.80	33.29
Track Renewals	166.18	207.87
Bridge Works	35.78	33.33
Traffic Facilities	235.35	231.22
Signal and Safety	56.74	57.45
Workshops & Sheds	55.74	42.01
Electrification	79.76	79.16

Plan-heads	Outlay for four years	Actual Expenditure
Other Electrical Works	18.37	18.45
Staff Quarters	23.56	22.56
Passengers Amenities	12.58	13.74
Staff Welfare	20.64	18.61
New Lines	82.80	80.63
Investment in Govt. Commercial Undertakings, Public Undertakings, including road services.	33.72	32.59
Other specified works	7.94	9.94
Inventories	(—)17.56	(—)182.72
MTP	34.92	33.29
Total	1680.43	1525.22

8.4.3. During the Fifth Plan, the spill-over in the allocations vis-a-vis spending was Rs. 9 crores for Rolling Stock, Rs. 2.2 crores in 'Bridge Works', Rs. 4 crores in 'Traffic Facilities', Rs. 13 crores in 'Workshops & Sheds', Rs. 1 crore in 'Staff quarters', and Rs. 2 crores in 'New lines'. The Railways, however, spent Rs. 2 crores extra on 'machinery & plants' Rs. 41 crores on 'Track Renewals' and Rs. 1 crore on 'Signalling & Safety'.

8.4.4. The amount spent on 'Inventories' forms a part of plan expenditure. The outlay provided during the Fifth Plan on 'Inventories' was (—) Rs. 17.56 crores. This meant that during this period the Railways would reduce their inventory balance by Rs. 17.58 crores. As against this, the Railways reduced their inventory balance by Rs. 182.72 crores, and hence the actual expenditure during the plan period has been shown as (—) Rs. 182.72 crores. This reduction could be as a result of special drive by the Railways to reduce inventories. Viewed from this angle, 'less spending under inventories' indicates better utilisation of available stock of inventories with the Railways. If, therefore, this element is taken out, the Railways have fully spent the funds allocated. The point, however, remains that the Railways might as well have used up at least a part of the savings under the plan head 'Inventories' on the optimisation of investments in plan in heads intended to generate additional capacity.

8.4.5. A discussion of the pattern of expenditure reveals that the Railways did not pay sufficient attention to utilising fully the outlays pertaining to replacements and maintenance i.e., 'Rolling Stock', 'Track Renewals', 'Workshops & Sheds' etc. @

8.5. The basic question, which remains unanswered, is whether the actual achievement of the organisation has been commensurate with the investments made,



and if so, to what extent. In earlier paragraphs, the capacity has been quantified and the years in which the Railways have almost achieved it have been mentioned. The perspective of the Sixth Plan does not look encouraging.\* The Sixth Plan outlay has to be seen in the context of allocations made for the 1978-83 Plan. For this Rolling Plan the Government had allocated Rs. 3350 crores against the requirements having been assessed by the Railways as Rs. 6265 crores. Eventually the allocation was much less as compared to the requirement of the Railways. These provisions did not fully cover the need-based requirements projected by the Railways. The relevant information is given in Table 2.12.

Table 2.12

**Allocation for 1978-83 Rolling Plan for coaches and wagons (in numbers)**

<i>Name of stock</i>	<i>Need-based requirement on replacement a/c. asked for</i>	<i>Requirements provided for</i>	<i>Difference</i>
Coaches	5,875	2,700	(—)2975
EMUs	302	251	(—)51
Wagons	64,025	43,500	(—)20525

8.5.1. While it is true that the allocation of Rs. 5100 crores for the current Sixth Plan/represents a sizeable increase over the allocation made for the Rolling Plan of 1978-83, it however does not seek to provide a capacity commensurate with the demand of freight. It also does not provide for any growth in passenger traffic, as it is evident from Table 2.13.

Table 2.13

**Replacement requirement (in numbers) in the Sixth Plan†**

<i>Name of stock</i>	<i>Need-based replacement requirements</i>	<i>Requirements provided for</i>	<i>Difference</i>
Coaches	7742	5680	(—)2062

8.5.2. It may be clarified that as far as wagons are concerned, the Sixth Plan provides for allocation of 1 lakh wagons and with this acquisition it should be possible to provide for the replacement requirements fully.

### 9.0. Inadequate allocations.

9.1. This has been discussed in detail in the preceding paragraphs. Railways assets today on the whole are in a very unsatisfactory condition, and therefore inadequate both in quality and quantity to squarely face the future challenges; track and rolling stock are over-aged and machinery and plant are antiquated, and there is woefully inadequate workshop capacity. The Committee would invite attention to the sombre implications of Table 2.14.

9.2. In this connection, the Committee would invite attention to Part I of their Report submitted in May 1982, highlighting the need for urgent investments on priority to get over the accumulated arrears. There is close correlation with antiquated assets and safety

factors. Safety is paramount on the Railways dealing with human lives. This also has been emphasised in Part I of the Report.

9.2.1. NTPC Report has also highlighted the desirability of helping the Railways to play their natural role on the basis of inter-modal split in the national transport scene. On the basis of energy-conservation alone, the rail transport system will have to be equipped for achieving the optimum in the inter-modal mix. In view of the prolific network of the Railways their natural capability to deal with long-flight traffic, and the national energy situation, NTPC have specifically stated that the share of rail traffic has to increase from the existing 68 percent to 72 percent of the total traffic. The Committee up hold this approach & the attendant strategy.

9.2.2. Viewed in the context of the declining trend of investments in the rail sector, the necessity to permit the system to overcome its arrears of antiquated assets to provide a resilience to the system and, most important, to equip the system for handling a larger share of traffic, as explained in the preceding paragraph, the Railways will have to be steadily given increased doses of investments from right now by larger outlays during the current and subsequent Five Year Plans: Sixth, Seventh and Eighth.

### 10.0. Ambitious efficiency assumptions.

10.1. A study of the process of planning reveals that in successive Plans, the Railways aimed at achieving targets, largely based on the turn-round, which were too ambitious under the prevailing circumstances in the economy. For instance, in the Fifth Plan, the target turn-round for the terminal year was indicated as 12.1 days on B.G. and 10.5 days on M.G. with a lead of 642 Kms. on B.G. and 470 Kms. on M.G. The Railways could not achieve better than a 13 days turn-round on B.G. Even the best turn-round achieved in 1976-77 was 13 days on B.G. On the other hand, the leads went on increasing. It appears necessary to provide for norms which are both realistic and pragmatic. It is desirable to set the target high, but while do in so, all relevant factors have to be taken into consideration.

### 11.0. Failure to provide for full replacement in preference to new acquisitions.

11.1. A reference has already been made to the formidable arrears of renewals and rehabilitation, particularly for track and rolling stock. Arrears in track renewals started building up after the Third Plan, but in wagons the Railways appear to have been behind all the time, though lately there has been somewhat increased backlog in wagons (as well as coaches). This is evident from Table 2.14.

Table 2.14

**Arrears of track renewals and wagon replacement**  
**I. Track.**

<i>Plan period</i>	<i>Arrears in Kms.</i>	
	<i>Primary renewals</i>	<i>Secondary renewals</i>
End of Third Five Year Plan As on 31st March, 1966.		Nil
End of Fourth Five Year Plan As on 31 March, 1974	2,400	1,500
As on 31st March, 1980	7,780	5,260
As on 31st March, 1981	9,200	5,940
As on 31st March, 1982	10,300	6,540

† Report of the Working Group on Railways for the Sixth Five Year Plan.  
Investment now being deferred will prove costly afterwards.

\* The Committee make this statement even after reckoning with the satisfactory freight movement during 1981-82.



## II. Wagons.

## III. Coaches.

Plan period	No. of wagons over- aged in vehicle units		Total	Plan period	No. of coaches (in units)		Total
	B.G.	M.G.			B.G.	M.G.	
End of First Plan 31st March 1956.	30,354	14,270	44,624	End of First Plan 31st March 1956.	3,817	3,210	7,027
End of Second Plan 31st March 1961.	22,187	10,649	32,836	End of Second Plan 31st March 1961.	5,218	3,428	8,646
End of Third Plan 31st March 1966.	25,879	13,669	39,548	End of Third Plan 31st March 1966.	4,434	2,737	7,171
End of Fourth Plan 31st March 1974.	12,054	10,464	22,518	End of Fourth Plan 31st March 1974.	2,273	19,00	4,173
As on March 1980	20,245	10,109	30,354	As on 31st March 1980	1,559	1,109	2,668
As on 31st March 1981	26,058	8,794	34,852	As on 31st March 1981	1,487	1,016	2,505
As on 31st March 1982*	21,242	4,467	25,711	As on 31st March 1982*	1,416	1,004	2,020

11.1.1. In order to have an assessment of the current replacement figures, Table 2.15 may be seen.

Table 2.15  
Replacement of wagons

	Number overdue replacement at the beginning of Sixth Plan (31-3-80)	Falling due during Sixth Plan (1980-85)	Total number to be replaced	Already replaced			Yet to be replaced
				1980	1981	Total	
B.G.	21,208 (20,245)	26,719 (26,169)	47,927 (46,414)	8,772	13,800	22,572	25,355
M.G.	12,382 (10,109)	1,131 (861)	13,513 (10,970)	2,700	4,000	6,700	6,813
Total	33,590	27,850	61,440	11,472	17,800	29,272	32,168

(Figures in brackets indicate wagons in terms of vehicle units).

11.1.2. The Railways ought to have exerted greater pressure for full replacement of wagons, locos, coaches etc. so that the organisation could be kept in top fettle.† The Sixth Plan has spearheaded a change, though resource-constraints, despite relatively higher allocations, will not permit renewals and replacements in full.

11.1.3. A factor inhibiting provision for full rehabilitation is also the modalities of operation of the Depreciation Reserve Fund. These are aspects, however, which will be dealt with in a later Report.®

#### 12.0. Lack of an integrated systems approach.

12.1. It was imperative for the Railways to have derived maximum benefits for the total system from the given investments. Firstly, the Railways distributed available funds over too many individual projects increasing thereby the gestation periods. Secondly,

while the Railways faced serious constraints of resources for what was essential, large number of items of infructuous nature‡ on non-economic considerations were taken up particularly in the field of new lines and gauge conversions.

12.1.1. The Committee have made a study at pages 98-111 in Annexure A-2.5 on new-line and gauge-conversion projects which are still under execution. The annexure indicates the original costs, the revised costs, the dates of sanction, the current progress and the likely dates of completion. While new lines sanctioned between 1972 to 1977 were not completed, further sanctions continued in each annual plan, though all the new projects were not justified on requirements of traffic density or growth. Same observations hold for the conversion projects. The Railways, particularly in view of the constraint of resources, should have adopted the more rational approach of first completing the on-

\* Provisional.

† Railway did not spend all the money on Track Renewals during Fourth Plan and perhaps aggravated the situation.

® The problems in the short-range has been covered in Part I.

The long range aspects will be covered under Railway Reserve Fund in Part IV of the Report.

‡ Not required to meet the growth of traffic or for such avowed purposes as 'national integration'.



going project before trying to undertake new ones of double validity as to their immediate needs from the viewpoints of density, growth of traffic, or priority.

12.2. The Committee have also observed that in the planning process there is lack of any serious assessment of advantages accruing from the projected investments as well as lack of a systems approach. The following few instances would illustrate this point :

1. Continuance of mixed traction on dieselised/ electrified routes. This refers to some trains being permitted to run by steam even on an otherwise electrified route, as happened on Delhi-Howrah route, similarly running some trains with diesels on an otherwise electrified route, which also is happening on the same route.
2. The progressing of electrification on a sectoral or a sectional basis, and not on a 'route' basis. This refers to the manner in which the whole electrification project for Delhi-Howrah was conceived, 'where even the sanction was issued section-wise', without taking into account the difficulties which were likely to be encountered by change of traction from section to section.
3. Failure to change the pattern of examination to suit roller-bearing stock and faster traction and bypass loads. This refers to the modernisation of stock by way of BOX wagons, but not changing the pattern of examination to permit uninterrupted hauls.
4. Failure to segregate the roller bearing stock\*. Even though BOX wagons were planned to be run as block loads, in actual implementation, these were allowed to be moved piecemeal, cluttering up the yards. In fact, piecemeal movement was envisaged for a type of wagon which was designed for block load ; and as it was required to be matched with conventional stock, a transition coupler was designed. In retrospect, this was a very damaging innovation, as it led to coagulation of the fleet. The effect of this coagulation can be judged by the increasing use of transition gear over the years.
5. Failure to step up maintenance facilities to match increase in rolling stock. The addition to rolling stock was planned from Plan to Plan, but a conscious decision was not taken to simultaneously increase matching maintenance facilities.
6. Neglect of passenger and goods shed terminals
7. Needless proliferation of surveys for new lines and gauge-conversions† without regard to the availability of track materials or financial resources.
8. Substitution of panel interlocking in place of two cabins at roadside stations without a check on complete arrival of trains.®
9. Non-maximisation of the trailing load.
10. Non-development of containerisation, particularly at transshipment points and for international freight.

12.2.1. A mention should be made of the relative neglect to passenger traffic, and of the continuance of a rather non-commercial attitude even 35 years after the end of colonial rule. Planning for opting for solutions, which appear to be least-cost to the Railways and not to the economy, is also frequently observed. A classic example is provided by the development of exchange yards.§

12.2.2. Another example is that of the present method of moving coal and many other bulk materials in block rakes of BOXs. The destination plant installs a tippler to unload these wagons, and for this it has to acquire diesel shunters plus a capstan or winch to position each wagon on the tippler. While the tipping time is only one minute, the placement time varies from 10-14 minutes. In addition, the sanctity of a rake is lost as the couplings and hoses have to be disconnected in each operation. If a systems view has been taken, the Railways ought to have gone in for bottom or side discharge wagons for unloading, which would have allowed the train to remain intact, and would have greatly curtailed the unloading time. They could have by now completed their experiments and formalised such movements for coal on a large number of captive routes on B.G., and could have benefitted from their experience with coal in respect of other commodities like iron ore, fertilizers, cement and foodgrains.

12.2. It must, therefore, be emphasised that planning for the future has to be based on an integrated systems-approach. All implications must be weighed before final investment decisions are taken. Decisions

Table 2.16†

Use of transition gear

Year	No. of transition gear indented	No. of special type wagons i.e. BOX/BOY etc. on line in units
1977-78	28,587	57,930
1978-79	65,047	59,631
1979-80	45,323	61,429
1980-81	63,790	63,604

\* This has now been done, the Committee was advised by the Railway Board.

† Reproduced from page 12 of the Report of Working Group on Operational Optimisation & Planning set up by the Railway Reforms Committee.

‡ Mostly as a sop to such demands, or to postpone an 'unpalatable negative decision'.

@ In the conventional system, a signman exchanges a signal with a Guard of the incoming train to ensure that the train has arrived complete. With panel inter-locking, the two cabins are replaced by a central panel and while the movement otherwise becomes faster, the net effect is lost because A.S.M. has to physically get this thing ascertained.

§ This has been discussed in Chapter V.



taken in grooves or sockets do not yield optimum advantage and are sometimes even counter-productive.

### 13.0. Failure to develop terminal capacity.

13.1. Railways have been preoccupied with the problem of 'movement' without giving adequate thought to 'terminal problems' of loading at the origin and unloading at the destination. Firstly, this increased the cost of the user, and secondly, it made the Railways somewhat impervious to advantages of modernisation of the handling systems at the terminals. This is a legacy of the past when loading/unloading was the exclusive concern of the consumer. The Committee have been informed by a large number of senior Railway executives\* that the terminal constraints both for the passenger and the goods traffic have become the biggest bottleneck, and unless this problem is tackled imaginatively it would not be possible to further improve the service. New terminals have to be planned both for freight and passenger services and particularly the passenger.

13.2. The concept of new terminals has to be developed along with mechanisation of handling facilities. New terminals have to be developed, where rake loads can be handled quickly by mechanical means both at loading and unloading ends. In Chapter V on Freight Transport, the idea of nodal points which supports this concept has been discussed.† The mechanisation of handling facilities at existing terminals can also be considered, though this has a relatively limited scope. At the same time, the new terminals and the mechanisation facilities have to be linked with the concepts of moving heavier loads of 4500 tonnes or handling new types of stock. Such heavy loads cannot be efficiently handled under the existing arrangements.

13.3. An allied issue is the introduction of containerisation, which can revolutionise the functioning of transshipment points (and for inter-modal and international freight). It is a part of mechanisation, which while a start has been made, the Railways have been slow to develop. No mechanisation at transshipment points has yet been introduced and primitive and pristine handling methods continue to be adopted. The Railways should be an energy-efficient mode and containerisation adds to their flexibility by extending advantages of road service, as the containers can be picked up and delivered at the users' place and at the destination.‡

13.4. The road services can also be coordinated with the nodal points. Such a terminal also increases the possibility of undertaking movement in block loads. While the Railways have all along realised that they should increasingly adopt movement in block loads, attempts to effectively induce medium and small consigners/consignees into clubbing their offerings needs to be made, and movement patterns coordinated and organised. Even for a commodity such as coal, the Railways have yet to achieve 95 percent movement in block-load formation. This shortcoming can be overcome only stimulating nodal points for dissipation by road within a hinterland for each nodal point. This also has been discussed in detail in Chapter V (para 6, page 172).

13.5. The development of terminal capacity has also to be related to changes in the design of wagons. The Railways have thus far been wedded to the concept of movement in a versatile wagon. This acts as a restraint in achieving the envisaged quantum-jump. It is necessary that they adopt wagon designs, which are suited for bulk commodities. For example, for coal and iron ore, a bottom or side discharge design is necessary. Such wagons should be introduced for specific power houses or steel plants/ports on selected captive routes.§

### 14.0. Lack of adequate data base.

14.1. The centralised planning on the Railways, as it exists today, suffers from lack of data. The estimates on which the planning effort is based are all 'on macro level', and depends on what proves to be guesstimates of user Ministries etc., oftentimes quite unreliable. No serious attempt appears to have been made to introduce a system for collection of data or origin/dissipation of traffic 'route-wise'. Moreover, the available data are essentially shortrange in character. Distortions are many and frequent. The Planning Directorate of the Board does not have the means to collect, coordinate or correlate and analyse such data. This can effectively and speedily be done only through the use of computers. This may be organized.

### 15.0. Revamping the planning organisation.

15.1. On many Divisions, planning is still not a whole-time effort in the absence of Planning Cells.\*\* These cells, however, exist at the Zonal levels, where the post of Chief Planning Officer has also been created. The role, however, of the Chief Planning Officer (CPLO) and his organisation has yet not been clearly defined, and he has been mostly reduced to the status of 'a miscellaneous handyman'. The officers, who should be placed on these posts strictly on the basis of their competence, experience and perspicacity, must oversee the total planning effort of the Zonal Railway and ensure that sectoral planning by individual departments is in conformity with the total planning effort.

15.2. The failure of CPLOs at the Zonal levels appears largely because of two deficiencies: firstly, suitable officers are not always selected for this appointment and secondly, they are 'not' given the necessary wherewithal. They are called head of the Department, but do not have the staff worth the name, nor the directive to take over leadership in the planning programmes of the Zonal Railways.

15.3. As far as the Committee could gather, at the Board's and zonal levels, the planning functions are given no real importance. The result is that the 'immediate' drives out the 'important' and the top echelon gives very little time to planning. Changes are required to curb and reverse this trend.††

15.4. The grass-root planning in the Divisions also suffers due to lack of staff and emphasis. No scientific plans are drawn up, nor are the required steps taken to augment the capacity of the saturated routes, as a systems growth. No solutions are discussed and devised in advance. In a sense, in the field, events overtake the planning effort, and decisions are taken on an adhoc problem-to-problem basis.

\* Both in the Railway Board and Zonal and Divisional headquarters.

† Para 6.

‡ It is not the intention to suggest that transshipment freight for all routes or for all traffic should be containerised.

§ Yet another design would be for movement of bulk commodities like cement in covers.

†† This will be discussed in a later Part of the Committee's Report on Organisation.

\*\* It should be possible to man the Planning Cells, by and large without creating extra posts by surrenders from another category or discipline.

†† This will be discussed in a later Part of the Committee's Report on Organisation.



15.5. It is therefore, necessary to change the structure, to strengthen the planning organisations under the CPLOs and give them a key role, and to establish small Planning Cells on all the Divisions, by reorganisation and adjustment of staff. Matching surrenders can be arranged from any class or discipline.

15.6. It also appears necessary to introduce the concept of 'indicative' planning at grass-root level. This would imply that each Division keeps certain plans ready for augmentation of route capacity taking into account the growth of passenger and goods traffic. Such plans should be imaginatively conceived and objectively appraised, indicating the steps required to be taken for the introduction of extra trains or larger number of coaches or higher trailing loads for freight (4500 tonnes). For doing so, they also require some system of obtaining traffic projections. For this, economic and marketing studies would have to be conducted and kept updated. Such studies would have to be done by the planning cells themselves. They would be required to indicate the likely traffic flows on saturated and near-saturated routes of the Division. This should also mark the beginning of a reliable data base. Such 'flows' will have to be analysed on 'route patterns'.

15.7. The projection and appraisal for planning projects at the Zonal and Board's level need to be undertaken on cost-benefit analysis techniques. Clearly the officers and staff deployed in the planning net-work would have to have special aptitude and training for this work.

#### 16.0. Change in the methodology of works programme.

16.1. It is essential to revamp the existing procedure of finalization of the Works Programme so that the Railway Board and the Ministers are exposed only to major investment programmes and the rest are controlled by General Managers who are the senior-most executives incharge of a whole region.

#### 16.2. We recommend the following rationalisation :

- At present, works costing more than Rs. 50 lakhs each require prior approval of the Railway Board for inclusion in the Preliminary Works Programme. Works costing less than Rs. 50 lakhs each are included in the Preliminary Works Programme at the discretion of the General Manager. The Preliminary Works Programme is then examined and discussed by the Board with the General Manager of the concerned Zone and deletions and modifications made. The total number of new works included in the budget for 1982-83 is broken up as under :

(In crores of Rs.)		
Monetary limit	No. of items	Cost
(1) Upto Rs. 20 lakhs	793	38.94
(2) Above Rs. 20 lakhs and upto Rs. 50 lakhs.	91	30.41
(3) Above Rs. 50 lakhs and upto Rs. 1 crore.	36	27.37
(4) Above Rs. 1 crore and upto Rs. 3 crores.	26	40.17
(5) Above Rs. 3 crores and upto Rs. 5 crores.	4	14.47
(6) Above Rs. 5 crores	8	221.46
<b>Total</b>	<b>958</b>	<b>372.82</b>

Out of 958 items, only 38 items (4%) cost more than Rs. one crore each. These 38 items cost Rs. 276.1 crore i.e., about 75% of the total cost. The Committee recommend that prior approval of the Board for inclusion of items in the Works Programme should be raised from Rs. 50 lakhs to Rs. one crore. Works costing more than Rs. one crore should be examined in detail by the Board and the decision whether or not to include them communicated to the General Managers. In order that the Board get sufficient time to examine these important works, a firm time limit should be prescribed by which the Railways should send details of all such works. The Railways should also be advised of the ceiling limits under each plan-head upto which they could on their own include works costing less than Rs. one crore each in the Works Programme. They should then prepare Final Works Programmes including all proposed Works whether above or below Rs. one crore each and submit them to the Railway Board.

- In the scheme of things envisaged by us, there will be no Preliminary Works Programme and no discussion of the Board with the General Managers of works costing Rs. one crore and above on which the Railway Board will themselves deliberate and decide. As it is, the present system of deciding costly works by the Railway Board on the basis of half-a-day's meeting with the General Managers, we would think, serves little or no meaningful purpose. Besides, leaving the works costing less than Rs. 1 crore each at the level of the General Manager, the Railway Board would be able to concentrate on very few items which are important and costly. These items though in number form only 4% of the total, account for 75% of the total cost. The delegation recommended will, therefore, still retain control of the Railway Board over a very large part of the expenditure on the new works.
- While approving works costing above Rs. one crore and laying down ceiling limits for the Zonal Railways to include works upto Rs. one crore each, the guiding principle should be that the ratio of throw-forward plus cost of new works (both above and below Rs. one crore) should not exceed 3 to 4 times the allotment of funds under each Plan head. With this control, the present practice of spreading the investments thinly on a large number of works will be eliminated.

#### 16.2. We recommend the following rationalisation :

- At present, works costing more than Rs. 50 lakhs each require prior approval of the Railway Board for inclusion in the Preliminary Works Programme. Works costing less than Rs. 50 lakhs each are included in the Preliminary Works Programme at the discretion of the General Manager. The Preliminary Works Programme is then examined and discussed by the Board with the General Manager of the concerned Zone and deletions and modifications made. The total number of new



works included in the budget for 1982-83 is broken up as under :

(In crores of Rs.)

Monetary limit	No. of items	Cost
(1) Upto Rs. 20 lakhs	793	38.94
(2) Above Rs. 20 lakhs and upto Rs. 50 lakhs.	91	30.41
(3) Above Rs. 50 lakhs and upto Rs. 1 crore.	36	27.37
(4) Above Rs. 1 crore and upto Rs. 3 crores.	26	40.17
(5) Above Rs. 3 crores and upto Rs. 5 crores.	4	14.47
(6) Above Rs. 5 crores	8	221.46
<b>Total :</b>	<b>958</b>	<b>372.82</b>

Out of 958 items, only 38 items (4%) cost more than Rs. one crore each. These 38 items cost Rs. 276.1 crores i.e., about 75% of the total cost. The Committee recommend that prior approval of the Board for inclusion of items in the Works Programme should be raised from Rs. 50 lakhs to Rs. one crore. Works costing more than Rs. one crore should be examined in detail by the Board and the decision whether or not to include them communicated to the General Managers. In order that the Board get sufficient time to examine these important works, a firm time limit should be prescribed by which the Railways should send details of all such works. The Railways should also be advised of the ceiling limits under each plan-head upto which they could on their own include works costing less than Rs. one crore each in the Works Programme. They should then prepare Final Works Programmes including all proposed Works whether above or below Rs. one crore each and submit them to the Railway Board.

2. In the scheme of things envisaged by us, there will be no Preliminary Works Programme and no discussion of the Board with the General Managers of works costing Rs. one crore and above on which the Railway Board will themselves deliberate and decide. As it is, the present system of deciding costly works by the Railway Board on the basis of half-a-day's meeting with the General Managers, we would think, serves little or no meaningful purpose. Besides, leaving the works costing less than Rs. 1 crore each at the level of the General Manager, the Railway Board would be able to concentrate on very few items which are important and costly. These items though in number form only 4% of the total, account for 75% of the total cost. The delegation recommended will, therefore, still retain control of the Railway Board over a very large part of the expenditure on the new works.

3. While approving works costing above Rs. one crore and laying down ceiling limits for the Zonal Railways to include works upto Rs. one crore each, the guiding principle should be that the ratio of throw-forward plus cost of new works (both above and below Rs. one crore) should not exceed 3 to 4 times the allotment of funds under each Plan head. With this control, the present practice of spreading the investments thinly on a large number of works will be eliminated.
4. The present system of providing a token outlay of Rs. 1,000 or so should cease. If a work is not necessary or if funds for the same are not available, it should be not included in the Budget. So long as it remains in the Budget, whether frozen or not, its cost is to be taken in the throw-forward amount for working out the aforesaid ratio.
5. The allotment of funds to various Railways should be need-based and according to the norms which may be fixed. For example, the Zonal Railways, where the percentage of staff housed is the least or where it is difficult to find accommodation should be entitled to receive a larger share of allotment under the Plan-head 'staff quarters'.
6. Volume 1 of the Works Programme, which reviews the Works-in-Progress should contain only works costing more than Rs. one crore, or works which linger for over five years from the year of inclusion in the Programme.
7. The Survey Reports are voluminous. The format of the survey reports should be standardised with an eye to precision, simplification and presentation.

#### 17.0. An outline of the strategy.

17.1. The planning effort has got a close interface with the optimisation of freight and passenger operation. The manner in which freight operations have to be organised in future have been discussed in detail in the chapter on 'Freight Transport' and at this stage it will suffice to give the strategies in outline as follows :

1. Development of nodal points for bulk traffic.
2. Coordinated road-cum-rail accessibility.
3. Accelerated pace of Railway Electrification.\*
4. Updating of electric loco technology.
5. Development of bottom or side discharge wagons for loose bulk commodities on specified or captive routes, along with development of a suitable design for such a wagon for carrying commodities moving in bags such as cement.
6. Change-over to air brakes and a sturdier design of wagons.
7. End-to-end examination practice without detachments enroute.
8. Improved maintenance of rolling stock track.



9. Reduction in the role of road-side stations and intermediate yards.
10. Increased reliance on automatic signalling, particularly on the quadrilateral and the diagonals along with bypass lines skirt congested terminals or areas.
11. Computerisation of freight on a real-time basis.
12. Modernisation of accident relief operations and deployment of new generation re-railing equipment.
13. Liberalisation of present moving dimensions.
14. Provision of communication between the Driver and Guard and the Driver and Control on high-density routes.
15. Installation of Automatic train Control devices to begin with on high-density routes.

17.2. To conclude, the scenario that emerges of 2000 A.D. is of the Railways carrying a much larger part of the traffic than at present in block trains in dedicated fleet of wagons (on specific and captive routes), on end-to-end patterns, with fully equipped/mechanised/modernised terminals, and carriage and wagon examination being done mostly at starting/terminating stations/yards. Such trains would go without any handling in the yards and would not be broken. Their cruising speeds would be high, and with re-result that a smaller fleet would carry greater loads to longer distances. This would also prevent the growth of staff and rolling stock to unmanageable proportions. The Railways will by containerisation and undertaking road delivery systems, improve their own flexibility as a complete service, increase the transport efficiency and reap good dividends.

#### 18.0. New Lines.

18.1. The subject of new lines has become sensitive in the background of the increasing regional aspirations for more and more new lines. The desire to open up new areas to rail-borne economic growth is natural, even through the constraints imposed by priorities of growth and lack of resources is a contrary factor.

18.2. The fact that the Railways have not been able to expand much, particularly in the post-independence era, is significant. Table 2.17 (page 75) indicates the expansion of the Railways ever since their inception decade-wise. It is evident that during the last 30 years, the Railways have expanded by a meagre 7644 kilometres, which strikingly brings out the inadequate growth of the rail network.

18.3. The development of rail transport has to be visualised along with other industrial development in a climate of continuing shortage of resources.

Accordingly, new lines should normally be taken up as project-oriented lines. The example of such lines are Kairala Road, Jayant, Koraput-Rayagada and Kota-Chitaurgarh. It would be equally necessary to provide the missing links on already congested routes, which should form alternative routes to relieve congestion where capacity cannot be developed even after doubling. In other words, where it becomes necessary

Table 2.17

#### Growth of rail network

<i>Year</i>	<i>Route kilometres at the end of the year</i>
1853	32
1860	1,349
1870	7,678
1880	14,745
1890	26,395
1900	39,834
1910	51,658
1920*	59,119
1929-30	67,148
1937-38**	66,105
1940-41	66,067
1944-45***	65,193
1947-48@	54,694
1949-50	54,753
1950-51	53,596
1960-61	56,247
1970-71	59,790
1980-81	61,240

to go in for a third line, the possibility of a new line can be explored. This will cover the freight-intensive routes joining the metropolitan cities which are working to near saturation and where on certain sections, a third line is called for. An example would be Mathura to New Delhi. Other new lines can be created or can be sanctioned on strategic considerations. Developmental lines can be conceived as a package of development

§ The Committee have read with interest the Report of a Tash Team which visited the Chinese Railways in early 1982. Even though the situation is not comparable in many aspects, not only on the Railways but also in respect of the entire economy, there is tell-tale evidence of optimum performance by adoption of such methods.

\* During the First World War seven lines aggregating to 745 kilometres were dismantled to meet urgent military requirements.

\*\* On the 1st April 1937 Burma Railways, length of 3,315 kilometres, were separated from the Indian Railway System.

\*\*\* During the Second World War more than two dozen selected

branch lines involving over 1,609 kilometres of rail length, were dismantled to provide track for military operations.

@ On 15 August 1947, due to Partition of the country, a length of about 11,198 kilometres of Railway fell in Pakistan.

Remarks : The kilometres upto 1949-50 included about 1,000 kilometres owned by Companies, District Boards, etc. These figures are not included in the subsequent years.

Source : (i) History of Indian Railways, Constructed and in progress (Corrected upto 31 March 1964).

(ii) Annual Report of Accounts 1980-81.



plan, where these are found essential despite the present resource-situation. The Committee have been told by senior railway executives that there has been a tendency to accept new line projects on non-economic considerations under socio-political compulsions or regional pressures. While restraint of resources last, this tendency has to be curbed.

18.4. It has further been observed that arising out of socio-political compulsions, the Railways also agree to undertake a large number of surveys for new lines, to bide time, purely as 'a policy of appeasement'. Not only investment-decisions on new lines should be taken with great care, but also where, *ab initio*, a line is likely to be unremunerative and strategic considerations are not involved, a survey should not be sanctioned; as this raises hopes and pressures.

18.5. Presently, construction is in progress on 30 new lines. These works are likely to cost, according to the latest estimates, Rs. 942 crores. Of this, a sum of Rs. 224 crores has already been spent and the balance required to complete the on going projects is Rs. 718 crores (inclusive of the outlay to be provided for the remaining period of the Sixth Plan). This has to be compared with the amount made available to the Railway by the Planning Commission from time to time, which has been as under :

Third Plan*	..	Rs. 206 crores
Fourth Plan	..	Rs. 15 crores
Fifth Plan	..	Rs. 97 crores
Sixth Plan	..	Rs. 380 crores
Total:	..	Rs. 698 crores

It appears obvious that the allocation required to be given to the Railways exceeds the allocation provided for the period 1981-85 i.e., 25 years. In other words, there is no reasonable chance of these on-going new-line projects being completed in the current Sixth Plan and even in the succeeding two Plans unless the plan outlays are increased substantially. It would thus take not less than another ten years to complete the on-going projects provided no further line is sanctioned during the interregnum and ignoring the escalation in prices.

18.5.1. The on-going new-line projects are categorised as follows :

Category	Description	No. of line	Estimated outlay (Rs. in crores)
A	Project-oriented lines	9	295.22
B	Strategic lines	3	84.01
C	Lines in N.E. region	6	64.87
D	Other lines	20	498.50
Total :			942.60

18.5.2. The above position is exacerbated by the fact that the assessment of annual requirement under Depreciation is of the order of Rs. 1100 crores.† Of this, the requirement for 'Track Renewals' is of the order of

Rs. 400 crores. It should be possible to spend this amount on track. Rehabilitation on worn-out assets has to be given a higher priority than construction of additional new lines.

18.6. There are 136 uneconomic branch lines and the loss suffered by these lines, was Rs. 32 crores during 1980-81. In addition, 28 lines constructed from 1 April, 1955 onwards were identified by the Expert Group on Capital Structure‡ as unremunerative. While no dividend is paid on the uneconomic branch lines as also on these 28 new lines, the operational losses have proved a milestone for Indian Railways, from one Plan to another. Some of these should be closed after a review.

#### 19.0. Recommendations on new lines.

19.1. The Committee, having studied the entire subject and having gone through the evidence tendered before the, recommend the following policy for construction of new lines :

1. Project-oriented lines\*\* should be accorded the highest priority, as they serve specific industrial projects. The investment-methodology for such lines should be changed; and the cost should be treated as an integral part of the specific project, even though the same will be borne by the Railways.

Presently, all new lines are constructed by outlays provided by the Planning Commission under the plan-head New Lines. While these lines are an integral part of specific projects, at the time when these projects were approved by the public Investment Board, the expenditure for the new lines is not sanctioned at the time and is left to be settled later by the Planning Commission when Railway outlays are sanctioned. The danger in such a course is that the individual entity of these lines and their importance gets lost in the totality of the package under New Lines. With the limitation of funds and the diversion of these funds to lines on other considerations, there is a danger to such projects either not being completed in time, or being affected by cost over-runs. The Committee, therefore, suggest that while sanctioning a project, the money for the new line must also be sanctioned.

2. The second priority should be given to missing links or, which can form alternative routes to relieve congestion on the existing busy high-density routes. Before taking the decision, the financial returns of both the alternatives, i.e. having a third line on the existing alignment or a new one, should be worked out and normally the cheaper alternative preferred.
3. Strategic lines will have their own specific priority, and will be dependent on circumstances justifying the laying of such lines.
4. The unbridled proliferation of uneconomic branch lines in today's context needs to be controlled. In view of the acute constraint of resources for development on the Railways, even for high-priority capacity-generating investments, such discipline is particularly essential during the Sixth and Seventh Five Year Plans.

\* Prior to this, there used to be a common plan-head which also included electrification and restoration of dismantled lines.

† The Railway Reforms Committee has dealt with this problem in a short-range perspective in Part I of its report.

‡ This group was appointed in March 1978 by the Ministry of Railway in pursuance of a Convention Committee recommendation.

\*\* The reference is to projects requiring a new lead-line or a terminal rail network.



19.2. While the above should be the broad policy frame-work for new lines, in view of the existing resource constraints and the clear knowledge that even the on-going works cannot be completed in a reasonable time, not to mention the protracted delays, which have already taken place, an immediate review of lines, which do not serve specific projects and are not required for movement of traffic and have not made significant progress, may be frozen until the other higher priority projects are completed.

19.3. It is clear that the progress of the new lines has been unsatisfactory because of lack of funds and the practice of spreading the inadequate outlays on a large number of projects, thereby leading to delays. Both these tendencies must be curbed. We consider that all new lines, when sanctioned, may be provided sufficient resources to ensure their completion within a reasonable time, which, in most areas, should not exceed three to four years.

#### 20.0. Gauge conversion.

20.1. The question of conversion has generally evoked substantial interest among the State Governments and the general public. This has been basically because of the declaration of a unigauge policy for the country at one time as a perspective for development, and because of the generally mistaken notion that metre gauge is not capable of giving results obtained on the broad gauge.

20.2. Investigation shows that the generally held impression of metre gauge being inferior to the broad gauge is not justified. This conclusion follows from the results being obtained on similar gauges in many other countries. The conversion of gauge should, therefore, not be *ipso facto* but should be based only on strong grounds. In fact, a study of a metre gauge system, viz. North Eastern Railway, where conversion of a route (Barabanki-Samastipur-Barauni-Katihar) has been undertaken, indicates that the conversion has brought difficulties to the travelling public because diesel locos have been replaced by steam locos, and lesser number of coaches in terms of capacity are now running due to shortage. This only highlights the failure that the concomitant facilities, including acquisition of required rolling stock have not kept pace with the planning. It is better to have conversion of a heavy-density line 'as a route', as otherwise difficulties of multiple transshipments at many points become a great handicap to the user. This has happened on Lucknow-Barabanki-Samastipur-Barauni-Katihar route. Conversion of this route has been taken in different patches, not connected to each other, and the working also was not started from one end. As a result, the user—the passenger and the trade and Industry have been exposed to serious difficulties. In some other cases of similar conversion, the difficulties of the major 'fingers' were over-looked, and this also led to multiple transshipments. Again, conversion of link routes like Varanasi-Bhatni can not be overlooked. Similarly such conversion should be conceived along with the requisite increase in terminal capacity. It appears to the Committee that on the Barabanki-Samastipur route this has not been done for the Lucknow terminal, and this has also increased the problem of the users.

20.3. The metre gauge system has suffered from neglect, primarily because of lack of inputs on a sustained basis. One of the main reasons responsible for such a state of affairs may have been as indicated earlier, the one-time declared policy of the Railways for establishment of a uni-gauge system by converting all metre gauge lines to broad gauge.

The policy emanated from an opinion that metre gauge operations were comparatively inefficient and expensive and that a multi-gauge system leads to increase in transit delays and generally hampers the growth of the country. This impression, however has proved to be a mistaken one.\*

20.4. It is recommended that an immediate beginning be made for undertaking all-round improvement of the metre gauge system. The directions of improvement would relate to track structure, introduction of heavy-duty freight locomotives, introduction of heavier freight wagons, increasing the maximum speed of freight trains and introduction of heavy-duty couplers in respect of freight traffic with new designs of wagons. On the passenger side, introduction of a number of inter-city trains on metre gauge routes at a speed of 80 to 100 kmph is called for. While this is a long term scenario, as a short-term measure, increase in the trailing loads of freight trains, enhancement of loop capacities as required,\*\* and provision of line capacity works, including patch doubling on saturated metre gauge routes, should be taken up.\*\*\*

20.5. For the Metre Gauge, it is recommended that heavy freight-intensive routes, particularly where transshipment becomes a physical bottle-neck, fully merit conversion. On this basis the conversion of Delhi Ahmedabad route is fully justified. As for other routes, it is necessary to ensure that the transshipment problem is solved by a two-pronged strategy : firstly for commodities such as coal, the transshipment has to be arranged through dumps and not on a straight method, as is being attempted now. The dump would imply unloading of B.G. coal wagons in dumps and reloading in the metre gauge wagons as the stock becomes available. This would reduce detentions and substantially reduce the turn round of the fleet. Secondly, for general goods, containerisation should be started in a big way, and mechanised aids should be pressed into service. This itself would change the picture at the transshipment point and it should become possible to handle increased transshipment without any claims and other attendant problems of labour.

20.5.1. It has been seen that the Railways have made no plans for modernisation of transshipment points. The Committee, therefore, recommend that this should be started as a pilot project by selecting two suitable transshipment points in different regions.† Again while B.G. trailing loads have continued to increase, the capacity for transshipment of the entire rake has not been commensurately developed at the transshipment points dealing with coal. The Committee understand that a block rake of coal has for example to be broken for being transhipped and suffers considerable delay. There also transshipment for the major and heavy streams should be 'through dumps', and facilities set up for handling block rakes on a high priority.

20.6. At the commencement of the Sixth Plan, a total of 4,000 Kms. were sanctioned for B.G. conversion (including 45 Kms. of narrow gauge). This included Delhi-Ahmedabad, Barabanki-Samastipur, Bongaigaon-Gauhati and Viramgam-Okha/Portbender sections. Barabanki-Samastipur has since been completed and Viramgam-Okha/Portbender is only half done. In addition a substantial portion of new sections were

\* The Board appointed a Committee of Directors to look into the various facets of metre gauge system and the Report of the Committee on Metre Gauge Operations was submitted in May 1979 which seeks to do away with this kind of impression.

\*\* A mistaken notice, is that enhancement of trailing load on

M.G. will *ipso facto* require loops to be increased.

\*\*\* As dealt with exhaustively and recommended by the Committee at\* above.

† Even though provision was made for this in the Works Programme a few years back, nothing has been done.



included for conversion. The total money required was Rs. 305 crores for on-going works alone based on the old estimates, out of which about Rs. 100 crores was required to complete Barabanki-Samastipur, Bongaigaon-Gauhati, Viramgam-Okha-Porbander and Barauni-Katihar sections. In the Sixth Plan, the total outlay for Traffic Facilities, which includes Conversion is Rs. 480 crores. It appears unlikely that the sum allocated by the Planning Commission, even Rs. 100 crores can be earmarked for completing the major schemes which have already reached advanced stages of execution.

20.6.1. It has been observed that there is a tendency to prolong the gauge conversion schemes taken in hand which lead to serious cost over-runs and delays in the completion of the projects. As a result, in the interim period, no benefit accrues to the Railways or the public, while large investments remain blocked in incomplete projects. This trend is reported to be to a large measure also due to the Railways, having been 'coerced into accepting unnecessary projects, later dragging their feet about their execution.

20.6.2. From a study of the Report of the Committee on Metre Gauge Operations, 1979, it is clear that metre gauge conversion by itself is no panacea for growth. This Committee made a study in respect of four branch lines, viz. Vijawada-Musalipatnam, Gudivada-Bhimavaram, Vijayawada-Guntur and Raninagar-Haldibari, and noted that the experience of conversion has shown that freight movement has actually dropped and that the traffic offering was (and continues to be) well within the capability of M.G. operations. In a way, therefore, these conversion projects were unnecessary.

20.6.3. The Committee would also reiterate their observations made in para 19.2 about progress of conversion of the major throughput-routes. These include the routes like Barauni-Katihar on the North Eastern Railway and New Bongaigaon-Gauhati and thereafter Gauhati-Lumding-Dibrugarh on the Northeast Frontier Railway, as also Hapa-Okha/Porbander on Western Railway. The need for progressing these works as also the Delhi-Ahmedabad route on Western Railway expeditiously has to be emphasised.

20.7. In view of what is stated above there is no doubt that there does not exist any possibility of undertaking any further schemes in the near future for conversion, and as we have stated in the preceding paragraphs, there appears to be no merit in doing so. The Committee, therefore, recommend that all conversion projects, 'other than those dictated entirely by the need of high traffic density and projections of traffic growth', like Delhi-Ahmedabad, or high priority consideration, should be frozen and resources diverted for improving the metre gauge system.

#### 21.0. Future of narrow gauge.

21.1. The narrow gauge system is widely scattered. The system was developed primarily to economise on the cost of construction in consideration of a low traffic profile.

21.2. Table 2.18 indicates the route kilometres and track kilometres Railway wise as on 31-3-1981.

Table 2.18

#### Route & Track Kilometres

Railway	As on 31-3-1981	
	Route Kms.	Track Kms.
Central	1,040.14	1,136.04
Eastern	131.65	144.77
Northern	259.56	299.92
North Eastern	..	5.29
Northeast Frontier	87.48	107.27
Southern	148.46	154.27
South Eastern	1,479.02	1,661.74
Western	1,099.48	1,267.24
Total	4,245.79	4,776.54

21.3. The system has shrunk by 19.3 percent in respect of route kilometres and by a similar amount in respect of track kilometres, as is evident from Table 2.19.

Table 2.19

#### A shrinking network

Year	Route kms.	Track kms.
31-3-1956	5,261.06	5,947.22
31-3-1981	4,245.79	4,776.54
percentage decrease	19.3	19.7

21.4. The main narrow gauge system is on the South Eastern, Central and Western Railways. For the other Railways, the system has a very precise delineation. On the Northern Railway, it covers Kalka-Simla and Pathankot-Jogindernagar; on the Northeast Frontier Darjeeling-Siliguri and on the Southern, Yashwantpur-Bangarpet. On these three Railways, the system caters primarily to passenger traffic and connects hill-towns, which are tourist-centres, covering picturesque valleys and magnificent views.

20.5. Tables 2.20 and 2.21 indicate the trend of passenger and freight operations on the narrow gauge.

Table 2.20

#### Trend of N.G. Passenger operations and earnings on Indian Railways

(In millions)

Year	Passengers carried.	Passenger Kms.	Passenger earnings
1950-51	29.72	817.13	13.29
1955-56	35.21	1,158.39	20.60
1960-61	38.57	1,275.55	22.06
1965-66	44.14	1,276.45	29.45
1970-71	46.69	1,350.16	34.94
1976-77	45.81	1,211.26	46.95
1977-78	45.69	1,243.02	48.56
1979-80	47.07	1,394.79	56.91
1980-81	47.00	1,415.55	58.44



Table 2.21

Trend of narrow gauge freight operations and earnings on Indian Railways.

Year	Tonnes originating	Earnings	Net Tonne Kilometres
1950-51	1.99	10.82	215
1955-56	2.43	12.91	271
1960-61	2.47	15.60	290
1965-66	2.75	20.25	339
1970-71	2.28	21.30	310
1976-77	1.76	28.44	249
1977-78	1.86	30.37	258
1979-80	1.54	30.16	226
1980-81	1.28	29.35	194

21.6. A study of the performance of passenger business indicates that the passenger traffic has increased by 58 percent in terms of originating passengers and 73 percent in terms of passenger kilometres during the period 1950-51 to 1980-81. If the lead of passenger traffic is studied, it is found that it has more or less remained static. If the leads are studied Railway-wise, it is found that it has gone up slightly on the South Eastern and Central Railways, and has declined overall on the other Railways.

21.7. The narrow gauge system indicates a consistent decline in freight performance, but a growth in the passenger business. Evidently, the future of the system is linked to passenger business. The lead of the passenger traffic is however, 30 Kms. which should be catered normally by road. It follows that the need is to develop road system in these areas so that passenger traffic can be switched over to road without inconvenience to the travelling public. It is, however, true that the Railways have not been given the necessary inputs broadly as the system has proved to be continuous drain on railway finances, as the working expenses have not been covered by the earnings.

21.7.1. The working expenses have also been rising continuously and have gone up almost six times on the Central Railway, five times on the Northern Railway, five times on the Northeast Frontier Railway, seven times on the South Eastern Railway and four times on the Western Railway. A detailed study is perhaps necessary to find out why the expenses have been going up when the traffic has been coming down and why the variations Railway-wise are pronounced.

21.8. NTPC\* have recommended closure of all narrow gauge sections, excepting the Central India narrow gauge system and the narrow gauge hill sections, on a systems approach. Government, in June 1982, have accepted this recommendation. This Committee also corroborate this recommendation, and suggest an early implementation.

21.9. There has been a view that even for the Central India and South Eastern narrow gauge networks, their conversion to adjacent main-land gauge should be explored. The Committee is unable to endorse this view. Such a conversion can be of some relevance in case the freight traffic was likely to develop in a big way over long distance. Since the case is quite the contrary, such conversion can only non-viable and can add to the total

loss of the system. This, therefore, should not be considered.

21.10. Where the Railway does decide to give up a narrow gauge route, it should be explored in consultation with the State Governments as to whether they would like to take over the embankment and the buildings, for development of highways and road-transport terminals and stations. and then the same could be, properly negotiated. This has been done in a number of foreign countries like the United Kingdom.

## 22.0. Conclusions.

22.1. To sum up, a scrutiny of planning on the Railways indicates that the rail network requires substantial investments which are capacity-generating; that the investments have gradually been coming down, and that this has impeded the capabilities of the network to meet the challenges of growth; and that the Railway's planning itself has suffered from many a drawback, the most important being lack of integrated approach on a systems basis, failure to provide for full replacements and to develop terminal capacities.

22.2. The Railways have also fallen into the unrealistic policy of carrying on a large number of new lines and conversion projects unmindful of the long gestation period and of the fact that no benefits have been derived either by the system or by the Railways themselves by thinly spreading the resources.

22.3. In future, not only the pitfalls of the past have to be avoided, but simultaneously the emphasis has to shift to undertaking projects in cases they can be completed in a reasonable time, and where integrated systems approach indicates substantial benefits for the Railways and the economy.

Annexure A.2.1

(Cf. para 4.3.2.)

## Assessment of Transport Capacity

'Net tonne kilometre method, is based on selecting NTKM per wagon day figure based on the trends of published statistics, as a possible goal capable of being reached. This figure is multiplied by 365 days to give the total net tonne kilometres, which can be produced by a wagon in a year. The total transport output required in a year of all the commodities is calculated separately based on the data furnished by the Planning Commission and the Ministries, and by a conceptual visualisation of leads. Dividing the total tonne kilometres which can be produced by a wagon in a year, the total number of wagons required is calculated.

NTKMs per wagon day figure is not strictly a 'on line figure'. While calculating this increase, the number of wagons on siding not worked by the Railways, the wagons in use of port trusts, railway wagons used on coaching trains, and wagons lent to other departments, or home line construction etc. are not accounted for. For broad gauge during 1980-81 the difference between 'wagon owned, and the number of 'wagons on line' was approximately 28,000. Therefore, in adopting this index, certain percentage has to be added to the requirements, calculated to make them realistic.

2. This method is equally used for calculating the requirements of locos. Once the total requirement has been calculated, the available fleet, which is known, is



deducted and the extent of shortfall required to be made good is known.

#### Turn-round Method.

3. In the earlier chapters, a reference has been made to the Railways being essentially a bulk carrier and to the fact that about 85 percent of the transport output is limited to bulk commodities. For these commodities, which are known, (fertilizers, cement, foodgrains, coal, steel raw materials to steel plants) the following assessments are first made :—

1. Lead in the terminal year
2. Percentage of loaded wagon kilometres to total wagon kilometres.
3. Speed of the trains
4. Detention in yards and terminals in number of days.

4. Given the lead, the percentage of loaded wagon kilometres to total wagon kilometres and speed it becomes possible to calculate the bare journey times of a wagon. To this is added the total detentions in yards and terminals, and thus the total turn round is determined. Based on the average lead per wagon, the number of wagons required to cater to one million tonne is calculated and for each commodity based on the turn round figure, the bare wagon calculations are made. To this is added the repair, POH and 10% surge (peaking) requirements.

#### Comparison

5. A comparison of the two methods is indicative of the fact that the NTKM method is far simpler than the other. It also involves an assumption of only one efficiency parameter whereas the assumptions in the other method are for a large number of variables. The turn-round method lends itself to greater precision provided that dependable data for all the major commodities are available. In theory, this is a superior method, but because of lack of data and complicated calculations, the other method has a more universal application.

#### ANNEXURE A.2.2

##### Estimate of Plan Expenditure incurred for generation of additional carrying capacity.

(Cf. para 7.2.,)  
(Rs. in crores)

Item	Third Plan	Inter-Plan	Fourth Plan	Fifth Plan	1978-79 (Actuals)	1979-80 (Actuals)	Total 1978-79
1. Total Plan Expenditure (Excl. MTP)	1686	763	1428	1523	537.54	714.28	1251.82
2. Less non-capacity generation expenditure,—							
(a) DRF (Excluding element of improvement which is shown in parenthesis).	297 (63)	213 (41)	422 (72)	386.1 (93.8)	127.4 (26.5)	165.6 (40.0)	293.0 (66.5)
(b) DF	131	64	97	76.3	25.0	28.0	53.0
(c) OLWR	53	27	35	29.4	10.3	9.6	19.9
(d) ACSPF	...	...	...	5.2	6.5	9.4	15.90
(e) Staff Quarters	...	...	...	12.0	9.9	9.3	19.2
(f) Investment in Road Services	8	5	13	32.5	26.1	10.0	36.1
(g) Electrification	81	36	70	78.9	21.0	18.8	59.8
(h) Inventories	76	2	77	(—)102.8	5.2	32.7	37.9
Total (2)	646	347	714	517.6	231.4	283.4	514.8
3. Hence expenditure on capacity generation with %age to the total (1—2).	1040 (61.7)	416 (54.5)	714 (50.0)	1005.4 (66.01)	306.14 (56.9)	430.88 (61.3)	737.02 (58.9)

#### ANNEXURE A.2.3

##### Railway's percentage share, with in the sub-head 'Transport & Communications' and the total outlay.

(Rs. in crores)

Name of the Sector	I Plan	II Plan	III Plan	Inter Plan				IV Plan	V Plan	VI Plan
				66-67	67-68	68-69	Total			
1. Agriculture & Community Dev.	354.0	568.0	1,068.0	332.5	376.5	327.7	1,036.7	2,728.2	4,643.60	11,058.80
2. Irrigation & Power.	647.0	860.0	1,662.0	464.7	543.0	493.1	1,501.1	3,534.2	10,734.18	38,695.47
3. Industry & Mining.	188.0	1,080.0	1,784.7	524.7	563.7	580.7	1,669.1	3,630.8	10,200.60	15,017.57
4. Transport & Communications.	571.0	1,345.0	1,486.0	428.0	418.8	426.2	1,273.0	3,238.0	6,881.40	15,646.23
5. Others	618.0	947.0	1,500.0	337.6	350.1	515.7	1,203.1	2,771.0	6,843.72	17,081.93
6. Total	2,378.0	4,800.0	7,500.0	2,087.5	2,252.1	2,343.4	6,683.0	15,902.2	39,303.50	97,500.00
7. Railways DRF	832.07 165.00	1,125.0 225.0	1,275.0 350.0	325.0 100.0	290.0 95.0	267.0 95.0	882.0 290.0	15,75.0 525.0	2,202.00	5,100.00
(Part of item 4)	267.07	900.0	925.0	225.0	195.0	172.0	592.0	1,050.0	2,202.00	5,100.00
8. Percentage of item 7 to item 4	46.77	66.91	59.89	52.57	46.56	40.37	46.50	32.42	32.00	32.59
9. Percentage of item 7 to item 6	11.23	18.68	11.86	10.79	8.66	7.34	8.86	6.60	5.60	5.23

N.B.—From I Plan to IV Plan, percentages of item 7 to items 4 & 6 have been worked out excluding the DRF element as DRF was not included in the total outlay. This was changed from the V Plan when it was included in the total outlay.



**Plan head-wise outlay asked for, outlay approved and actual expenditure for for each plan period.**

S. No.	Plan head	1st Plan (1951-52 to 1955-56)			2nd Plan (1956-57 to 1960-61)		
		Outlay (Original)	Outlay approved	Actual expenditure	Outlay (Original)	Outlay approved	Actual expenditure
1.	Rolling Stock	209.96	253.44	288.44	...	380.00	372.62
2.	Machinery & Plant	...	...	14.06	...	65.00	17.00
3.	Track Renewals	64.87	64.41	68.03	...	100.00	154.22
4.	Bridge Works	...	...	...	...	...	...
5.	Workshops & Sheds	5.60	...	...	...	33.00	32.06
6.	Traffic Facilities	...	...	...	...	...	28.10
7.	Signalling & Safety	...	...	...	...	186.00	173.44
8.	New Lines	...	...	...	...	25.00	17.31
9.	Restoration of dismantled lines	34.18	33.20	33.35	...	66.00	77.83
10.	Electrification	...	...	...	...	...	...
11.	Other Electrical Works	...	...	...	...	65.00	53.77
12.	Staff Welfare	...	...	...	...	...	11.32
13.	Staff Quarters	...	...	...	...	50.00	37.80
14.	Other Structural Engineering Works including ICP, CLW, GBP, Collieries & Ports.	69.99	70.48	68.10	...	...	...
15.	Passenger Amenities	15.00	13.29	13.34	...	15.00	14.71
16.	Miscellaneous items	2.40	(—)2.75	(—)1.17	...	...	...
17.	Inventories	...	...	...	...	50.00	17.72
18.	Extra for Imported Steel	...	...	...	...	40.00	...
19.	Port	...	...	...	1425	3.50	...
20.	C & W Workshops & Railway Electrification	...	...	...	...	15.00	...
Total		400.00	423.07	423.73	N.A.	1125.00	1343.69

S. No.	Plan head	3rd Plan (1961-62 to 1965-66)			Inter-Plan (1966-67 to 1968-69)			4th Plan (1969-70 to 1973-74)		
		Outlay (Original)	Outlay approved	Actual expenditure	Outlay (B.E.)	Outlay approved	Actual expenditure	Outlay asked for	Outlay approved	Actual expenditure
1.	Rolling Stock	510.0	576.50	542.36	352.96	336.08	319.45	568.0	568.00	587.47
2.	Machinery & Plant	...	30.00	11.01	7.93	13.24	9.59	25.0	25.00	21.46
3.	Track Renewals	170.0	190.00	215.28	112.42	109.47	87.89	180.0	180.00	158.22
4.	Bridge Works	25.0	25.00	27.87	22.97	18.95	16.88	29.0	29.00	26.43
5.	Traffic Facilities	183.0	281.00	320.48	161.65	145.23	128.44	234.0	234.00	224.97
6.	Signalling & Safety	25.0	30.00	37.77	30.95	34.22	32.15	49.0	49.00	60.88
7.	Workshops & Sheds*	62.0	32.00	47.59	125.39	21.81	13.26	30.0	30.00	19.48
8.	Electrification	70.0	98.00	80.71	48.82	44.44	36.14	73.0	73.00	70.04
9.	Other Electrical Works	8.0	8.00	4.36	8.24	6.73	5.09	15.0	15.00	18.51
10.	Staff Quarters	50.0	35.00	44.29	17.19	18.66	17.93	36.0	36.00	31.42
11.	Staff Welfare	...	15.00	16.74	8.63	9.97	8.37	20.0	20.00	15.17
12.	Passenger Amenities	15.0	15.00	14.63	11.85	11.86	10.72	20.0	20.00	19.60
13.	New Lines	147.0	206.00	211.96	65.29	59.92	56.21	86.0	15.11	14.10
14.	Investment in Road Services	10.0	10.00	7.65	5.10	5.20	4.71	10.0	3.05	2.45
15.	Other Specified Works	15.0	15.00	27.42	12.21	10.92	14.08	10.0	10.00	9.58
16.	Inventories	35.0	15.00	75.71	5.40	8.74	1.80	15.0	15.00	76.65
17.	M.T.P.	...	...	...	...	...	...	...	20.00	8.56
Total :		1325.00	1581.50	1685.83	897.00	855.44	762.71	1400.0	1420.00	1428.31

\* Figure includes provision for Plan head 'Machinery & Plant' also.



S. No.	Plan head	5th Plan (1974-79) *		(1974-78)
		Outlay asked for	Outlay approved	Actual expenditure
1.	Rolling Stock	1120.0	1057.00	782.00
2.	Machinery & Plant	49.0	42.00	42.00
3.	Track Renewals	209.0	209.00	146.00
4.	Bridge Works	151.0	47.00	32.00
5.	Traffic Facilities	399.0	316.00	226.00
6.	Signalling & Safety	79.0	71.00	56.00
7.	Workshops & Sheds	115.0	78.00	42.00
8.	Electrification	126.0	101.00	79.00
9.	Other Electrical Works	28.0	23.00	17.00
10.	Staff Quarters	40.0	28.00	22.00
11.	Staff Welfare	18.0	15.00	19.00
12.	Passenger Amenities	16.0	15.00	14.00
13.	Other Specified Works	10.0	9.00	10.00
14.	New Lines	160.0	97.00	80.00
15.	Investment in Road Services	50.0	49.00	33.00
16.	Inventories	30.0	(—)5.00	(—)97.00
17.	M.T.P.	70.0	50.00	33.00
Total		2570.0	2202.00	1523.00

\* For the Fifth-Plan, the outlay approved was for the period 1974-79, though the actual expenditure is for 1974-78. This is because the Plan terminated in 1977-78.

#### ANNEXURE—A.2.5

present value of cash outflow increases as under :

(Cf. para 12.1.1.,

A note on delayed project implementation; new lines and conversions.

#### 1. Background.

1.1 On the Railways, the financial return earlier used to be worked out as at the time of completion of a project and not through its entire useful life. Even for new lines, the returns worked out were in the first year, the sixth year and the eleventh year after opening of the line to traffic and did not give any indication of the total gain expected over the entire life of the project. This system was unscientific as it took no account of the opportunity cost of the money and was replaced in 1971-72 by discounted cash flow technique. In the latter technique, the effects of the timing of cash outlays and receipts are taken into account and the financial gain worked out is over the entire expected life of the project. In this technique, the financial return of the Project is greatly dependent on the schedule of investments; the return of the project falls with the increase in the period of completion even if there is no escalation in the cost. The following example would illustrate this.

1.2 If, for example project costing Rs. 1 crore is scheduled to be completed in four years' time with, for simplicity of calculation, an outlay of Rs. 25 lakhs each year. Assuming that the opportunity cost of capital is 10%, the present value\* of the stream of cash outflow of Rs. 25 lakhs for four years would be Rs. 25 lakhs × 4.641@ = Rs. 1.16 crores.

1.2.1. As the period of completion increases, the

Period of completion (in years)    Amount† to be spent every year (in crores of Rs.)    Compound amount factor for uniform series at 10% compound rate of interest.    Present value of cash outflow of (in crores Rs.) (2) × (3)

1	2	3	4
4	0.250	4.641	1.160
5	0.200	6.105	1.221
6	0.166	7.716	1.286
7	0.142	9.487	1.355
8	0.125	11.436	1.429
9	0.111	13.579	1.508
10	0.100	15.973	1.593

1.2.2. Thus with the increase in the period of completion the value of cash outflow increases thereby reducing the net gain of the project. The table below gives the position :

Increase in period of completion beyond the originally scheduled period of 4 years.    Fall in the Net gain of Project (in lakhs of Rs.)

0	..
1	6.1
2	12.6
3	19.5
4	26.9
5	34.8
6	43.3

Graphically the position is represented at page 57.

\* This is the value on the date of completion of the project.

@ Compound amount factor for a uniform series.

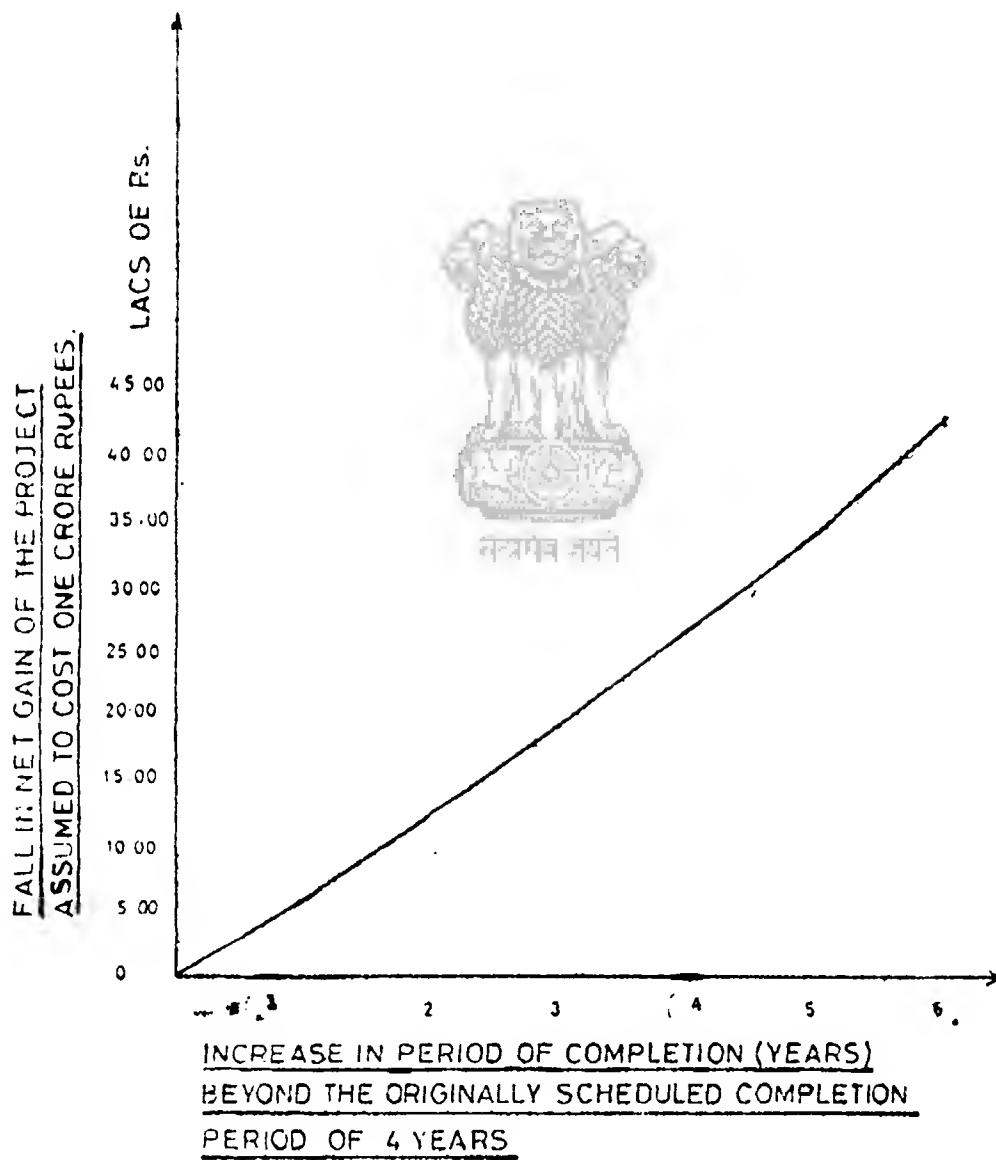
† It is presumed that the investment amount of Rs. 1 crore has been spread over uniformly throughout the period of

completion.

‡ Figures in Col. 4 of the preceding table less Rs. 1.166 crores which is the present value of cash outgo for 4 years of completion.



## EFFECT OF DELAYED COMPLETION OF PROJECTS





1.3. In the above example the present value of cash outflow at 10 % opportunity cost is Rs. 1.16 crores. If the project is to be financially viable, it must yield uniform stream of earnings of Rs. 12.3\* lakhs per annum over a period of 30 years.

<i>Period of completion (in years)</i>	<i>Present value of cash outflows (in crores of Rs.)</i>	<i>Present worth factor for a uniform stream of earnings of Rs. 12.3 lakhs per annum for a period of 30 years to achieve indicated in Col. (2) 012 3</i>	<i>Approximate interest rate at which the Present worth factor for 30 years equals the figure shown in col. 3.</i>
(1)	(2)	(3)	(4)
4	1.160	9.43	10.0
5	1.221	9.93	9.4
6	1.268	10.45	8.9
7	1.355	11.01	8.2
8	1.429	11.62	7.7
9	1.508	12.26	7.1
10	1.593	12.95	6.4

1.4. How the financial return gets affected by increasing the period of completion is indicated in the table.

the project falls down from 10% to around 6%. The picture is represented graphically at page 59.

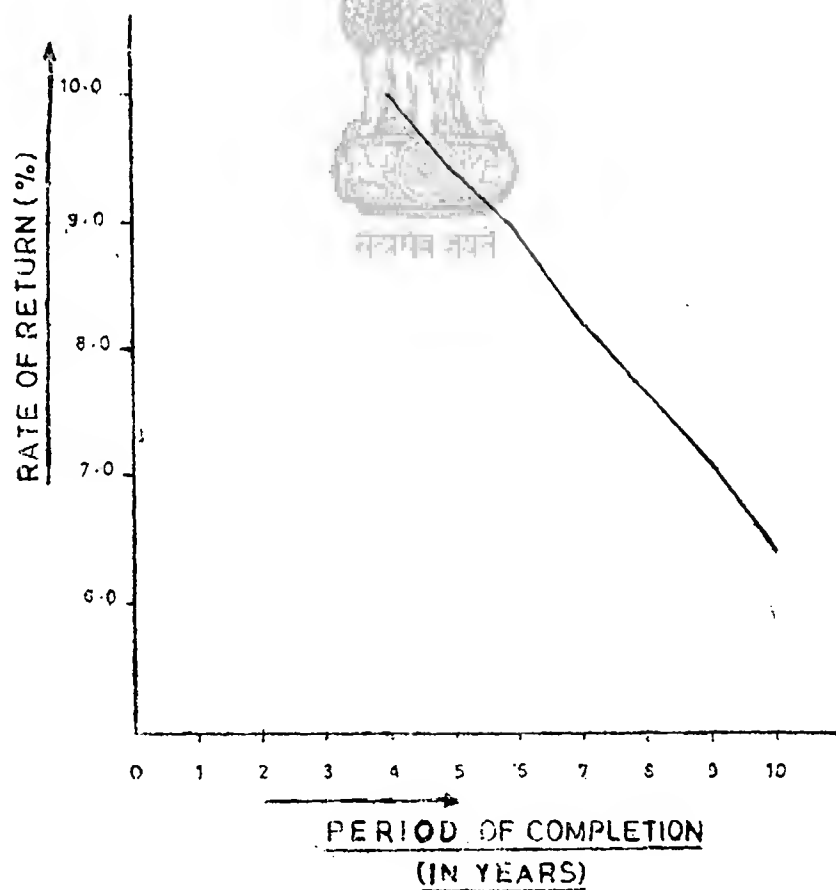


\* This amount has been worked out by dividing Rs. 1.16 crores by 9.427 which is the 'cumulative present worth factor for uni-

form series '. (30 years, 10% interest rate).



RELATIONSHIP BETWEEN RATE OF RETURN  
AND  
PERIOD OF COMPLETION.





## 2. Position on the Railways.

2.1. Execution of new Projects like new lines and conversion has lingered over long period of years. This is because the Railways go on adding to their list of works, even when there are no additional matching resources of funds and material, and some times no additional resources at all.

2.2. The total throw-forward in respect of works-in-progress under all plan-heads for 1982-83 is Rs. 2.663 crores. New works added under the above plan heads in 1982-83 cost Rs. 614 crores. The money required therefore to complete all these works would be Rs. 3,277 crores against which the outlay provided in the year 1982-83 is Rs. 553 crores, giving an overall ratio of 5.93 (Rs. 3277 ÷ 553).

2.3. The ratios of 12.17 and 18.27 for 'new lines and 'gauge conversion' respectively implies that it would take over 12 and 18 years respectively to complete all the new lines/gauge conversions included in the budget and that too if during this period, no escalation takes place and no new work is added. The position for other plan-heads like 'new lines', 'traffic facilities', 'doublings', electrification, etc., though not as bad as for gauge conversion, does merit attention.

2.4. It has already been shown above that with the increase in the period of completion, the net gain of the project drops down heavily and the position gets aggravated with inflation. The lingering of the projects increases their costs and makes it difficult to monitor their physical progress. The establishment once created has to be continued without sufficient workload, and the projects remain unproductive for an unduly long period.

2.5. How the delay has affected the cost of the Projects will be clear from the following 'life' cases which are only illustrative :

	Vasai Road-Diva Road gauge link (42 kms.)	Shahdara-Saharanpur Broad Gauge line (157 kms.)	Bangalore-Guntakal conversion (a parallel broad gauge line from Guntakal to Dharmavaram and conversion from Dharmavaram to Bangalore City (267 kms.)
	1	2	3
Original year of sanction.	April, 1972	August, 1973	December, 1971.
Originally scheduled for completion.	4 years	5-6 years	4 years
Originally estimated cost.	Rs. 12.72 crores.	Rs. 17.42 crores.	Rs. 17.59 crores.
Revised estimates—			
(i) 1st revised estimate.	Rs. 23.48 crores (in May, 78).	Rs. 22.52 crores (in June, 77).	Rs. 24.31 crores (in April, 78).
(ii) 2nd revised estimate.	Rs. 29.50 crores (in May, 82).	Rs. 30.38 crores (in Feb., 81). — anticipated to be further revised to Rs. 33 crores.	Rs. 40.82 crores (revised recently).
Present progress	After 10 years 87.2% (An outlay of Rs. 3.26 crores is still required to complete work).	After 9 years 90%	After 11 years 80% (An amount of Rs. 12.12 crores is still required to complete the work).

2.5.1. The special features of these projects are as under :

### 1. Vasai Road-Diva Broad Gauge link (42 Kms.).

Vasai Road-Diva is a traffic oriented line and was sanctioned to overcome the difficulties in handling the interchange of goods traffic between Central and Western Railways at Dadar. At the time the project was sanctioned originally, all the details were not available. Even a decision whether to electrify this line with 25 KVAC or 1500 VDC was taken later on. The position presently is that though the civil engineering portion of the work has been completed, this link has not been opened to traffic as the electrification work is still in progress. This is indicative of a lack of coordination resulting in an asset remaining unused. The cost of the work has also gone up from Rs. 12.74 crores to Rs. 29.5 crores, mainly due to delays and consequent escalation in prices and wages.

### 2. Shahdara-Saharanpur Broad Gauge line (157 kms).

Shahdara-Saharanpur line was sanctioned through supplementary budget in 1973. To expedite progress, an urgency certificate of Rs. 2.2 crores was sanctioned even though the final location survey of the line was in progress. This is a project-oriented line and the intention of the Government was to complete it early as otherwise they would not have gone to the Parliament for a supplementary grant and sanctioned an urgency certificate. But the work lingered on and now it is anticipated to cost Rs. 33 crores, double of the original estimate. Though the line has been opened to traffic, all the works have not yet been completed.

### 3. Bangalore-Guntakal conversion (a parallel broad gauge line from Guntakal to Dharmavaram and conversion from Dharmavaram to Bangalore City-267 kms.)

This work was included as an out-of-turn work in the budget for the year 1970-71. This was considered to be a priority project in the perspective plan for gauge conversions as it provided a more direct and shorter broad gauge link between north and south. The work, which was planned to be completed in a period of four years, is still not complete. The project is now estimated to cost over Rs. 40 crores, including material modifications of Rs. 3.2 crores. As a matter of fact at one stage, even the original cost of Rs. 17.59 crores was reduced to Rs. 13.3 crores by providing sand ballast instead of stone ballast and second-hand rails etc., presumably with a view to improve the financial viability. Later on, sand ballast was substituted by stone ballast and second-hand rails by new rails. It is not a satisfactory situation in which a work is sanctioned as an out-of-turn work but is later on allowed to drag on. The initial estimate was also not prepared realistically and had to be revised a number of times.

### Progress of Works costing more than Rs. 5 crores

#### NEW LINES

S. No.	Project	Original estimate	Estimated cost in the 82-83 Works programme	Target date	%age progress upto 6/82
1	2	3	4	5	6
<b>CENTRAL RAILWAY.—</b>					
1.	Wani-Chanaka BG Rail link upto Pimpalkuti (1973-74).	5.30	12.50	Org. 6/82 Rev. 6/83	49.51



1	2	3	4	5	6	1	2	3	4	5	6
2.	Apta-Roha BG rail link (1978-79).	9.00	20.57	Org. 6/83 Rev. 6/84	62.48	23.	Karur-Dindigul-Tirunelveli-Tuticorin (1981-82).	42.86	68.69	Not fixed	...
3.	Vasai Road-Diva	12.72	29.50	Org. 4/76 Rev. 6/83	87.23						
	<b>EASTERN RAILWAY.—</b>						<b>SOUTH CENTRAL RAILWAY.—</b>				
4.	Kairala Road-Jayant (1977-78)	16.64	25.00	3/82(Ph. I) 3/83 (Ph. II)**.	93.5	24.	Bibinagar-Nadidude BG (Bibinagar-Nalgonda Ph. I) taken up (1974-75).	13.46	29.34	3/85 (Ph. I) Ph. II opened	46.45
5.	Howrah-Sheakhala BG line (1973-74).	3.50	7.00	@	...	25.	Bhandrachalam-Rd. Manugu BG (1977-78).	8.05	16.03	Org. 6/83 Rev. 3/84*	92.0
6.	Budge Budge-Namkhana (BK) (1981-82) BG.	20.77	20.77	Not fixed	...	26.	Manikagarh-Chandur BG (1979-80).	6.00	9.26	6/84*	28.00
	<b>NORTHERN RAILWAY.—</b>					27.	Motumari-Jaggeya-petta BG (1980-81).	7.00	10.74	Org. 3/85 Rev. 6/85	Work will start Now
7.	Shahdara—S. Hiranpur (73-74).	17.42	34.38	Opened to traffic.	...		<b>SOUTH EASTERN RAILWAY.—</b>				
8.	Rohtak-Bhiwani (1974-75).	6.12	7.94	Opened to traffic.	...	28.	Howrah-Amta including Bargachia Champandanga (BG) (1974-75).	10.72	31.78	@ (Phase I Howrah Bargachia)	80.00
9.	Jammu-Udhampur BG (1981-82).	50.50	70.00	Not fixed	0.05	29.	Jakhapura-Banaspani BG Phase-I Jakhapura-Daitari 33.05 kms.) Phase-II Daitari-Keojhargarh (1975-76).	39.00	75.00	@ Upto Daitari opened traffic.	...
10.	Nangal Dam-Falwara BG (1981-82).	33.50	33.50	Not fixed	...	30.	Talgaria-Tupkadih BG (1979-80).	15.50	7.70	Org. 3/84 Rev. 6/84 (for 16.7 kms.)	32.00
	<b>NORTH EASTERN RAILWAY.—</b>					31.	Koraput-Rayagada (BG) (1981-82).	112.0	112.10	Ph.-I Dec. '85*	...
11.	New BG line from Rampur to New Haldwani (1974-75)	12.98	23.50	@	13.8		<b>WESTERN RAILWAY.—</b>				
12.	Sakri Hasaipur Road MG line (1974-75).	4.75	10.33	@	1.0	32.	Kapadvani-Modasa BG (1978-79).	5.38	10.00	@	8.5
13.	Bagaha-Chitauni (MG) Restoration (1974-75).	6.74	64.61	@	9.0%	33.	Kota-Chittorgarh-Necmuh BG (1980-81).	41.09	70.00	3/87	...
	<b>NORTH-EAST FRONTIER RAILWAY.—</b>					34.	Bhuj-Naliya (1981-82).	22.00	22.00	...	...
14.	Gauhati-Burnihat BG rail link (1978-79).	8.20	14.72	@	1.30						
15.	Dharamanagar-Kumarchat MG (1978-79).	9.67	30.09	6/84*	9.5		<b>Gauge Conversion.—</b>				
16.	Balipara-Bhaik-pong MG (1978-79).	4.70	10.97	6/84*	24.00						
17.	Silcher-Jiribam MG (1978-79).	12.13	26.67	Org. 3/84* Rev. 6/85*	3.55						
18.	Amguri-Tuli MG (1978-79).	4.83	6.00	Org. 3/85 Rev. 6/85*	2.00						
19.	Lalaghat-Bhairahi MG (78-79).	10.76	25.80	Org. 3/84 Rev. 6/85	4.26						
	<b>SOUTHERN RAILWAY.—</b>										
20.	Alleppey-Frankulam BG.	7.00	18.26	Org. 3/84 Rev. 6/85.	18.00						
21.	Tirunelveli-Trivandrum Central via Nagercoil with a branch line from Nagercoil to Kanyakumari (1971-72).	14.53	38.72	...	Opened to traffic.						
22.	Chitradurg-Rayadur MG (1981-82).	18.00	20.20	Not fixed	...						

£ The line has been certified for goods traffic from 25-11-80.

\*\* Subject to availability of land.

\* Subject to additional fund being made available in the current year following mid-term plan approval.

@ Not a priority project and, therefore, no revised target can now be fixed.

Note.—Figures in brackets indicate the year of sanction.



1	2	3	4	5	6	1	2	3	4	5	6
<b>N.F. RAILWAY.—</b>											
3.	Barabanki-Samastipur (1971-72)/U.P./Bihar.	47.11	123.10	Opened on 12-7-81.	...	15.	Manmad-Parbhani-Purt Vihanath (1973-74) upto Aurangabad.	28.00	15.6	@	18.25 (Ph. I)
4.	Varanasi-Bhatni (1977-78) U.P.	13.91	30.00	@	10.2	16.	Guntur-Macherala (1974-75) A.P.	8.21	28.29	@	2.09
5.	Samastipur-Darbhanga (1974-75) Bihar.	4.75	12.00	Not fixed	...	<b>WESTERN RAILWAY.—</b>					
6.	Moradabad-Ramnagar (74-75) U.P.	7.50	10.89	@	12.10	17.	Viramgam-Okha-Porhunder (1972-73) Gujarat.	42.93	97.00	June, 84	74.2
7.	Kashipur-Lalkuan-New Haldwani (1974-75) U.P.	9.00	9.08	...	...	18.	Nadiad-Kapavanj NG to BG (1978-79)	4.05	8.00	@	7.75
8.	Barauni-Katihar (1978-79) Bihar.	20.00	33.49	@	35.3	19.	Deihi-Sabarmati (1981-82).	108.00	N.A.	@	...
9.	Barilly-Kathgodam (81-82).	20.00	20.00	Not fixed	...	<p>@ Not a priority and, therefore, not target can now be fixed</p> <p>Item No. 7 Included in Supplementary Budget for 1981-82; clearance yet to be obtained. Survey is in progress. Planning Commission will be approached for sanction after the survey report is available.</p> <p>Note.—Figures in brackets indicate the year of sanction.</p>					
<b>N.F. RAILWAY.—</b>											
10.	New Bongaigaon-Gauhati (Parallel BG line) (1974-75) Assam.	24.79	65.00	Org. 6/82 Rev. 12/83	69.71	<p>A scrutiny of the statement indicates that, firstly, the period of gestation has been excessive as the allocation has been spread thinly over a large number of projects; secondly, that the revised cost in many case is rather obviously under-stated and, therefore, does not fully reflect the escalation in cost, and thirdly, a number of projects not required on traffic justification have been included, which in turn, have diluted the importance given to those projects, which are badly required for movement of traffic growth.</p>					
11.	Gauhati-Dibrugarh (81-82).	100.00	100.00	@							
12.	Kainar-Barauni-Siliguri (1981-82).	42.70	42.00	@							
<b>SOUTHERN RAILWAY.—</b>											
13.	Bangalore-Mysore (1980-81) Karnataka	13.3	40.82	@	80.2						
<b>SOUTH CENTRAL RAILWAY.—</b>											
14.	Guntakal-Dharmavaram-Bangalore (1972-73) AR/Karnataka.	17.58	42.50	@	80.20						



## CHAPTER III

### PASSENGER TRANSPORT

#### 1.0. Introduction.

1.1. Railways have proved to be the most economical and effective system of transport under certain given conditions. The relative advantages of transit by rail over road are :

1. Capacity per lane space of rail transit is over 10 times more than road transit.\*
2. Segregated rail transit is nearly free from accidents whereas road vehicles cause many accidents and with increase in traffic these are likely to increase.
3. Road vehicles burning fuel, badly maintained as at present, cause serious health hazards as well as smoke and smog etc.
4. Noise pollution is less by rail than by road.
5. If road transport significantly increases, the existing road system cannot support it.
6. With over crowding, the speed of road traffic will substantially go down.

1.2. The Committee have felt after a scrutiny of the planning process, that the apportionment of resources has, by and large, been weighted in favour of freight transport. In their view passenger transport deserves higher consideration than has been extended to it. This is a feature common to all the Five Year Plans, apparently

dictated by consideration of Economic Development. Passenger transport has often been called the Cinderella of the Indian Railways.

1.3. This is best demonstrated by the tell-tale absence of a precise estimation of the growth rates for passenger traffic in considering most of the Five Year Plans, in clear distinction from freight traffic, (for which such estimates were available, and from the fact that the estimates (where available) of growth profile considered for passenger traffic were evidently under-stated. This is illustrated by Table 3.1.

1.4. The Fifth Five Year Plan provided for a growth rate of 4 percent for non-suburban passenger traffic against an actual growth rate of 7 percent. It has been brought to the notice of the Committee† that conditions of travel deteriorated during the Fifth Five Year Plan, despite desultory efforts and introduction of some super-express trains. The Sixth Plan does not contain 'any' traffic targets in respect of passengers. This may be because the constraint of resources did not permit any allocation of funds for the manufacture of coaches on additional account, which would be required for introducing new trains, or on the routes converted to B.G. like Lucknow-Barabanki-Samastipur on North Eastern Railway or Viramgam-Hapa on Western Railway.

#### 2.0. Balanced Policy.

2.1. There appears to have been a dichotomy in the thinking ; a beginning is, therefore, required to be made now to restore the required balance.

Table 3.1

Growth of passenger traffic : actual vis-a-vis anticipated

Terminal year of the Plan	Non-Suburban				Suburban			
	Originating passengers (in millions)		Passenger Kms. (in millions)		Originating passengers (in millions)		Passenger Kms. (in millions)	
	Actual	Anticipated	Actual	Anticipated	Actual	Anticipated	Actual	Anticipated
First	776	Not fixed	54,235	Not fixed	499	Not fixed	8,165	Not fixed
Second	911	892	65,993	62,370	685	N.A.	11,704	N.A.
Third	1,057	1,048	79,059	758,920	1,026	N.A.	17,234	N.A.
1966-67	1,110	N.A.	83,676	N.A.	1,081	N.A.	18,469	N.A.
1967-68	1,151	N.A.	88,095	N.A.	1,106	N.A.	19,068	N.A.
1968-69	1,129	1,191	87,425	N.A.	1,084	N.A.	19,515	N.A.
Fourth	1,217	N.A.	107,627	N.A.	1,437	N.A.	28,037	N.A.
Fifth	1,515	N.A.	137,300	122,695	1,928	N.A.	39,400	33,644
1978-79	1,606	N.A.	149,500	134,635	2,113	N.A.	43,400	42,292
1979-80	1,602	N.A.	159,900	138,563	1,902	N.A.	38,700	44,909

\* This is based on the calculations done by the Working Group on Metropolitan Transport set up by the RRC. The calculation is based on passengers carried by buses and by rail in the city streets of the United States of America. Normally, the capacity by buses is 4,500 per hour and by Rail Rapid Transit

45,000 per hr. i.e. ten times : the crush capacity is about 60,000.

† By a Working Group on Passenger Transport set up by the Committee.



2.2. A balanced approach would, in future years, imply requisite emphasis being given to passenger traffic as well, in streams which are the rightful responsibility of the Railways. Only then it would be possible to meet the challenges of passenger growth in a satisfactory manner. It should at the same time be stressed that there should not be any dilution in freight transport which is so vital to national economic development. Both passenger and freight have to be fully provided for.

### 3.0. Inter-modal split.

3.1. For its future role, the Railways must also consider the energy-starved environment in which it would have to operate. There is already a rapid awakening of energy-consciousness all the world over. In a sense the world is on the threshold of an energy renaissance. Developed countries are now engaged in the task of a realistic reassessment of the relative energy costs of different modes of transport in order to evolve a strategy for deciding the inter-modal split. This for us is a matter of much greater concern. We face formidable constraints of resources, and have no option but to adopt policies which would permit apportionment of the scarce resources on a basis of rigid priorities and achievement of maximum benefits for the society.

3.2. The problem of inter-modal split becomes all the more difficult as well as important because of the long distances of travel.

3.3. Evidently, a strategy is required to be developed in which the other modes, particularly the road transport, also plays its logical economic role. If the large transport growth, which is expected,\* has to be handled with efficiency and better comfort, the denouement of the role of passenger transport in the overall rail transport development and, in particular, the position of short distance and sectional non-commuter traffic are issues which have to be satisfactorily resolved. At the same time, carriage of long distance passenger traffic by road, which would be economically wasteful, has also to be viewed in the correct perspective. There are other modes also, such as shipping and airways ; but their present share in the aggregate national transportation is a small fraction of the total, and may not have an impact on the total for a long time to come.

3.4. Table 3.2 Indicates the growth of passenger traffic by the various modes and the percentage share of each mode.

3.4.1. The table proves that Railways and roadways are overwhelmingly the principal modes of transport, that both have witnessed considerable growth, and that the share of the Railways has considerably dropped in the last 30 years : from being three times of the road transport it is now half of it.

### 4.0. Suitability of the Railways.

4.1. The Railways are ideally suited for long distance traffic, and continue to be the major mode of travel

in the country. On the other hand, short distance traffic has been attracted in a big way by road due to inherent advantage of road services for such traffic with its higher frequency and easier accessibility to city centres and countryside habitations. The question to be answered is : at what stage, and for what share the rail should take over from the road.

Table 3.2

Growth of passenger traffic by all modes of transport in billion PKMs.

Year	Rail	Road	Air	Total (Rail + Road)	Percentage share	
					Rail	Road
1950-51	66	2.3	...	89	74	26
1955-56	62	31	0.3	93	67	33
1960-61	78	57	0.6	135	58	42
1965-66	96	95	1.0	191	50	50
1968-69	107	140	1.4	247	43	57
1970-71	118	169	..	287	41	59
1973-74	136	208	1.9	344	40	60
1974-75	126	219	2.6	345	37	63
1975-76	149	225	2.6	374	40	60
1976-77	164	235	2.9	399	41	59
1977-78	177	250	3.4	427	41	59
1978-79	193	373	4.0	566	34	66
1979-80	198	411	4.2	609	33	67

4.2. The question of inter-modal split has been gone into in detail by both CTPC and NTPC, and it would be appropriate to go over their analysis of the issue. A brief on the subject, therefore, has been given as Annexure A-3.1. The study made for NTPC has since been updated.

### 5.0. Short-distance traffic.

5.1. The recommendation of NTPC that the Railways should not expand their services for short distance passenger traffic has recently been accepted by the Government†, with the proviso that corridors of high density passenger traffic between short distance pairs of points should be identified and catered for by the Railways. For other short distance, areas, an integrated plan for introducing bus services should be adopted and the relative fare structure should be such as to discourage travel by rail.

5.2. The problem of running the stopping passenger trains exists mainly for the trunk routes, as they act as a restraint on the faster trains and the throughput. On the branch lines, the running of these trains does not

\* Chapter I, Profile of Traffic Growth.

† Extracts from the Memorandum of the Planning Commission, embodying views of the Government and plan action on the recommendations of NTPC.

Rec. 9.3 Railways should not expand their services for short distance passenger traffic except between pairs of points where the density of traffic is very high. For short distance traffic, feasibility of introducing more buses in certain States needs to be explored. (Para. 9.8.1 and 9.8.2).

Views of the Government Accepted (June 1982).

Plan of Action

The corridors of high density passenger traffic between short distance pairs of points should be identified for taking necessary action. For other areas an integrated plan for introducing bus services should be adopted. The relative fare structure in such areas for the Railways and road services, should be such as to discourage travel by rail. (Para 17.41).



pose any operative problem. It is also a fact that in certain areas, presently, the stopping passenger trains are running to cater to high-density passenger traffic, which falls under the category of suburban-like traffic. This must continue but in these areas the ultimate solution would be to go in for EMUs or diesel/electric EMU-like conventional commuter fast trains.

5.3. The Committee cannot but appreciate that the withdrawal of the existing sectional services, even when justified conceptually, will result in inconvenience to the accustomed users, and is, therefore, likely to be resisted at least until the roadways are able to fully take their place. Withdrawal or reduction of these passenger services, if it becomes possible, should, in the beginning, be confined to the quadrilaterals and the diagonals, as the latter have to discharge the overwhelming national transportation responsibilities for both freight and passenger throughput.

5.4. The following steps should, therefore, be adopted by the Government :

1. No further proliferation of any sectional stopping passenger trains may be allowed,\* except for strongest possible reasons.
2. Scaling down where feasible of the existing slow sectional passenger services may be planned only on the quadrilateral and diagonal routes, so that 'eventually' only one pair of up and down services remains.
3. In the first phase, the sections to be chosen should be those, where the maximum number of stopping sectional passenger trains are being run, deeply eating into the route capacity and not being adequately used by passengers. For example, a section, where four such trains are being run, should be tackled first ; then a section, where less than four such trains are being run. Withdrawal of these trains again should be in graduated stages dependent on the density of traffic.
4. Even for one up and one down services, which are recommended to be run, stoppages could be rationalised and at some stations, alternate-day services may be provided, stopping at alternate stations, so that no single station is deprived of a service at least on three days in a week.
5. Co-ordinated services should be developed on the road so that passengers do not suffer in any way.
6. The released capacity can be used to run inter-city medium distance passenger services and speedier transport of freight throughput.

5.5. The Committee have noted that a chasm exists in the fares for smaller distances between rail and road. A random sampling was done and this reveals a position as indicated in Table 3.4.

5.6. Generally speaking, the existing fare structure gives an incentive to the short-distance passenger to travel by rail even where road transport is more convenient. However, if the fare structure is comparable in the two modes, the passenger would be more free to choose, and should generally find a bus more convenient

because of its frequency and stoppages at more convenient places.

Table 3.4

Comparative fare position, April 1982

	Roadways	Railways	
		Mail/ Express	Ordinary
	Rs. P.	Rs. P.	Rs. P.
Delhi-Ambala	16.30	15.00	10.70
Delhi-Chandigarh	20.75	19.50	14.00
Delhi-Panipat	6.40	8.00	5.30
Delhi-Sonapat	3.00	4.50	2.70
Delhi-Meerut	6.65	6.50	4.30
Delhi-Saharanpur	15.10	13.50	9.80

5.7. The scaling down of stopping sectional passenger services refers only to other than commuter and commuter like traffic in concentrated areas. It does not relate to the problem of commuters converging in large numbers around the existing metropolitan cities or metropolis-like centres, whose problem is quite different. Considering the sheer volume of such traffic, the Railways are the 'only' suitable mode to meet this demand. Illustrative examples are provided by Electric Multiple Unit Services in Bombay, Calcutta and Madras areas.

5.8. Suburban-like traffic is being presently catered to by stopping passenger services on sections like Lucknow-Kanpur, Vadodara-Ahmedabad, Burdwan-Asansol, Amritsar-Ludhiana.† The suburban-like traffic, which is developing around local centres in these areas, has also to be met by running commuter services with electric/diesel-hauled long corridor trains, EMUs, or Electric Train Sets.

#### 6.0. Strategy for the future.

6.1. To do justice to this task, the Railways will have to adopt a multi-pronged strategy. In this connection the problem has been studied specially in respect of :

1. Categorisation,
2. Maintenance,
3. Production,
4. Terminals and planning,
5. Parcels traffic.

#### 7.0. Categorisation.

7.1. In regard to long distance and inter-city trains, maximum emphasis should be laid on the optimisation of the trailing load, so as to clear maximum number of passengers per train on the heavy and important routes.

\* Strongly recommended also by NTPC.

† These sections are illustrative and not exhaustive.



7.2. The Railways already made a beginning in this respect and have augmented the trailing load of trains indicated in Table 3.5.

7.3. It is understood that the Railways have also already programmed to optimise the trailing load in respect of a number of other trains on important trunk routes, namely, Delhi-Bombay, Delhi-Calcutta and Delhi-Madras. In most cases, such optimisation of trailing load is being worked out by double-heading of the locomotive.

7.4. The Committee understand that in the remaining years of the Sixth Plan, it would not be possible to introduce additional inter-city passenger trains, because of serious resource-constraints and limited acquisition of coaching stock.\* Against a replacement requirement of 7,742 coaches the Sixth Plan provides for only 5,680, i.e., about 2,000 coaches short of the replacement needs alone.

Table 3.5

## Augmentation of trailing load

Name of train	Number of coaches	
	Trailing load before augmentation	Trailing load after augmentation
Tamilnadu Express	13	21
Kalka-Howrah Mail	17	21
Kerala-Karnataka Express	14	21
Andhra Pradesh Express	14	21
Grand Trunk Express	17	21
Rajdhani Express (Howrah)	9	12
Rajdhani Express (Bombay)	10	18
Tinsukia Mail	18	20

7.5. For efficiency and convenience of passengers, clearly this replacement and augmentation programme should be speeded up. Therefore, during the remaining years of the Sixth Plan and during the Seventh Plan, the Railways should take this device of optimising the trailing load up to 22 coaches or even more to its logical conclusion in respect of the largest possible number of trains on passenger-heavy routes.

## 8.0. Long-distance and inter-city traffic.

8.1. Long-distance inter-city traffic will have to be catered by fast services. The services will normally connect two pairs of points, for instance, Delhi-Bombay, Delhi-Madras, Delhi-Calcutta. In order to achieve this, it would be necessary to introduce inter-city services also for stations enroute for which the passenger traffic is being provided today by long distance trains.†

8.1.1. The question arises as to how the Railways will meet the demands of passengers travelling from one intermediate station to another, say from Bhopal to Nagpur or from one intermediate station to the terminal, say from Bhopal to Madras. For such cases, it would be necessary to earmark adequate quotas or coaches in the long-distance trains for inter-city service.

8.1.2. This should also enable the curtailment of stoppages of inter-city trains at intermediate-halts. For example, if the through trains to Madras stop for 10 Minutes at Bhopal it should be reduced to five minutes, by devising a fool-proof system of passenger information-service on such matters as the platform position of the coach, details of accommodation and reservation. The basic idea is to come to the assistance and guidance of the second-class passenger.

8.1.3. Such a strategy would imply the following three steps :

1. Assessment of pairs of points, where inter-city services will have to be run.
2. Assessment of the likely quotas for passengers travelling from intermediate stations to other intermediate stations or to the terminal.
3. Reduction in the period of existing halts.

## 9.0. Speeds of inter-city trains.

9.1. A related aspect is the speed with which inter-city trains are required to be planned. Considering the remarkable strides taken in high-speed technology, as evident from the speeds being attained on the French and Japanese Railways, there is always a temptation of opting for much higher speeds. We have tried to weigh the advantages of very high speeds with other related factors such as management problems supporting sophistication in the working system, distances involved, duration of travel etc. and have concluded that opting for much higher speeds may, atleast in the near future, become counter-productive in the Indian context in view of the following reasons :

1. It will accentuate the already existing differential between freight and passenger services, thereby creating capacity problems.
2. It will require disproportionately heavy investment on track and rolling stock.
3. It will entail large scale air-conditioning of coaches and considerable step-up in sophistication and would add to costs all-round and may require unacceptable fare-hikes.
4. The net effect of higher speeds would be a saving of a few hours and not proportionate to inputs, outlay, and increased fares.

9.2. We, therefore, favour the speeds for inter-city travel for the present to continue to be around 110 kmph.

9.3. This, however, should not stop R & D efforts in regard to any specific model section, or as part of export endeavours (which would require us to keep in line with modern technology). This is also not to

\* On M.G. routes which have since been converted to B.G., viz., Lucknow-Barabanki-Samastipur, this has, as indicated earlier, given rise to an anomalous situation, leading to lesser clearance of through-put after conversion.

† For example, inter-city trains would be required to be introduced between Kanpur-Delhi, Bombay-Bhopal, Durgapur-Howrah, Vijayawada-Madras, etc. These are illustrative examples.



say that the existing high priced Rajdhani Express trains, which were booked at higher speeds, should be slowed down, except to the extent required for the optimisation of trailing loads.

#### 10.0. Medium-distance inter-city services.

10.1. The inter-city long distance services will link major centres of industrial and commercial activity with towns within a radius of 800 Kms. or so. Besides the Railways will also have to cater to the inter-city medium-distance services, linking satellite towns with major centres of industrial and commercial activities. Such services should enable the passengers to perform a round trip during the day (journey time not more than three or four hours).

10.2. With speeds around 110 Km/h, as discussed above, this would cover a distance of about 300 kms. Such services would be justified in areas, where substantial number of persons, say 1,500 to 2,000, travel every day. Examples of points for which such services can be suggested would be Delhi-Chandigarh, Calcutta-Tatanagar, Delhi-Agra, Lucknow-Allahabad.\*

#### 11.0. Tourist and holiday services.

11.1. To give a fillip to internal and international tourism, the Railways will also have to plan for specialised passenger services. Another category of such specialised services would be the services to meet the holiday rush, particularly during summer or Puja Holidays, where in the past also the Railways have been providing for additional services. While the tourist traffic would be on a regular basis (once a week) or once a fortnight, the holiday traffic would be on a seasonal pattern.

11.2. As far as the tourist specials are concerned, these will have to be organised for fixed itineraries and combined with road facilities to permit the tourists to do sight-seeing during the day and travel during the night. Essentially, it has to be a package programme; and the package would not work if the rail-cum-road facilities are not fully coordinated. The advantage in having 'known and well-set' itineraries would be that it would avoid uncertainties, enable advance booking as well as planning and coordination of arrangements.

11.3. India has a large potential for tourist traffic, which covers a wide range from the majestic Himalaya in the north to the exquisite architecture of the South, in fact in all directions all over the country. This vast potential has so far not been fully exploited because of inadequacy of coordinated dependable transport facilities.

11.4. A few specialised itineraries† for the development of tourism, are given below :

1. Delhi - Agra-Khajuraho - Sanchi - Aurangabad-Bombay.
2. Delhi-Lucknow-Varanasi - Gaya-Howrah-Puri-Bhubaneswar-Howrah.
3. Bombay-Pune-Goa-Bangalore-Mysore-Madras.
4. Delhi-Jodhpur-Jaisalmer-Bikaner-Delhi.

11.5. As for the holiday specials, during the holiday seasons, the broad pattern of running would be to orga-

nise special long distance and medium distance inter-city trains. There have been reports that these services are presently run in a disorganised manner with scant regard to their advertised schedules, amenities and cleanliness. There is no reason why these services cannot be improved and run to a schedule that the Railways themselves advertise. For this there is need for proper planning, attention and monitoring.

#### 12.0. Services on metre gauge.

12.1. As already discussed in the Chapter-II, the popular image of the metre gauge being a relatively inferior system is not correct. The system is capable of much better performance. Deficiencies being observed today are essentially an outcome of an adequacy of investments and neglect of the system. The solution, therefore, lies in the uprating of the system and improvement of its performance by deliberate and positive measures. In addition to what has already been recommended in Chapter II,‡ it is recommended as follows :

1. Selective line capacity inputs should be undertaken on the following routes :
  - (i) Kasganj-Mailani-Dudwa-Gorakhpur,
  - (ii) Agra Fort-Phulera-Jodhpur-Bhildi,
  - (iii) Ajmer-Khandwa,
  - (iv) Hyderabad-Guntakal-Hubli,
  - (v) Miraj-Londa-Hubli-Bangalore
  - (vi) Madras-Villupuram-Trichy-Tuticorin.
2. Track and rolling stock should be uprated to introduce passenger services at speeds upto 100 Km/h, to being with on some selected routes.
3. Diesel locomotives to be used on passenger trains should be designed to haul train loads upto 20 coaches at speeds upto 100 Km/h.
4. More inter-city trains on the pattern of broad gauge should be introduced.
5. Terminal facilities should be improved in a big way, even by going in for new passenger terminals where necessary.

#### 13.0. Maintenance.

13.1. In view of its importance, the subject is being discussed in detail in another part of the Report. Here only the broad profile of the concept is being indicated.

13.1.1. The existing maintenance ideas are based on origin-destination sequence. At present maintenance is not a function of distance. While a rake which is running on Delhi-Bombay route is examined after 1000 Kms, a train running from Delhi to Moradabad is scheduled for identical examination at a distance of 200 Kms.

13.1.2. All rake maintenance links need to be reviewed and revised, so that each rake can cover the maximum possible distance 'as one or more trains in the time table'.§ This will also optimise vehicle utilisation.

\* The sections are illustrative and not exhaustive.

† These are illustrative ; and the actual itineraries are best left to the Railways and the Department of Tourism of the Central and State Governments. The return trips can also be worked

out and advertised for interested tourists.

‡ Transport Planning.

§ This can be arranged by adjusting and/or combining rake links.



13.1.3. Terminal and maintenance planning are clearly in need of sweeping changes. They have to be integrated as a system. The time taken for placement, withdrawal, washing, and attention to sick coaches greatly reduces the effective availability of the fleet. This is a legacy of make shift arrangements and trimming of initial costs in the past. There is considerable scope for reducing the current ineffective percentage of 17 to 18 on passenger carrying vehicles (with more than 30 percent for Air Conditioned stock). Poor availability, for whatever reasons, increases pressure on the maintenance staff and rake links and results in shoddy work, unclean liness and a fall in standards.

#### 14.0. Production.

14.1. Implementation of the strategies already defined above, such as running of 22 coach trains or introduction of inter-city trains on B.G. routes inclusive of trunk M.G. routes converted to B.G. would require additional coaching stock. As indicated earlier, the Sixth Plan provides only 5,680 coaches, less than even the replacement need of 7,742 coaches. While the Report of the Working Group on the Sixth Plan on Railways indicates that the country has a capability of manufacture of 6,754 coaches during the Plan period funds have been allocated for the manufacture of only 5,680 coaches. In other words, the existing production capability is also not being fully utilised. While the requirements are no doubt so heavy as to necessitate additional coach manufacturing capacity, it appears wrong not to place sufficient orders to utilise the existing capacity in full.

14.2. The Railways cannot continue with overaged stock. The Committee have already made certain recommendations in Part-I of their Report submitted to the Government in May, 1982. This Report seeks to highlight the need for making resources available to the Railways to overcome the problem of overaged stock which are incapable of providing the necessary comfort or the requisite standards of safety.

14.3. The Railways cannot do justice to the anticipated growth in passenger traffic without the introduction of additional inter-city and long distance passenger service. This would not be possible without adequate coaching stock. It is therefore, imperative that action is initiated for setting up one new Coach Factory immediately. This has also been stressed in Part-I of our Report.\*

14.4. The production of coaches has also to be viewed in the light of the need for provision of spare coaches. Previously, spare coaches at important terminals such as Delhi, Calcutta, Bombay etc. was an accepted tenet of management. This provision has been completely eaten away during the last few years, and a stage has been reached where the coaches, which are not found transit-worthy at the last moment, cannot be replaced and the trains run with short composition resulting in waste of haulage capacity as with considerable inconvenience to passengers.

14.5. Such spare coaches are essential to healthy operation and have to be provided. This is only possible, if the production of additional coaches is arranged which appears feasible to a significant extent even in the

existing production units in a comparatively short time. To conclude, an integrated programme should be arranged :

1. To make the fullest use of the existing capacities of coach production in the country; for this Government should arrange additional funds during the Sixth (and Seventh) Plans.†
2. To restore the 'spare stock' at the metropolitan towns in the first instance, followed by other terminals on a time-bound programme.
3. To run all or most of the long distance inter-city trains with 22 coaches with double-heading, to begin with on the quadrilateral and the diagonals.
4. To provide a cushion for export.‡

14.6. The production of coaches has also to be seen from the point of view of multiplicity of coach designs. The future composition of trains also, therefore, needs to be decided. The Committee have suggested two types of special services, viz., long distance/medium distance and short-distance inter-city trains. The long distance traffic would require sleeper accommodation and short distance traffic would require sitting accommodation. It would, therefore, be necessary to standardise the composition of the trains for the two types of services, so that the production of the required type of stock is organised for the long term requirements. Following types of coaches are suggested :

1. Second class day coaches with cushion seats.
2. Second class sleeper with cushion berths.
3. A.C. Chair cars.
4. A.C. Two-tier sleepers.
5. First class A.C. coaches.

14.6.1. In addition to this, normal SLRs, tourist coaches, etc. would have to be produced. §

14.7. The rationale for the inter-city medium distance service covering a distance upto about 300 kms. and inter-city long distance services covering upto 800 kms. and beyond has already been established. These two categories of services will require different types of coaches and the composition would also vary. For long distance traffic, more sleeping accommodation and A.C. accommodation would be required, which may not be necessary for medium distance.

14.8. The Committee, therefore, consider that it should be possible to standardise the composition of trains. This would also enable development of necessary maintenance facilities and a more efficient maintenance. These rakes could also be used for unscheduled services when the need arises.

\* Para 7.7, of Part I of the Report.

† Full capacity of ICF, BFML etc. should be tapped.

‡ The Indian Railways occupy a special position in South and South East Asia. They can also give consultancy to developing countries in this region as also in Africa and Latin America

for development plans and provision of operating and management cover. To spearhead such an effort, it is necessary that the Railways are quipped with resources to export coaches.

§ The manufacture of SLRs, essential from consideration of both safety and punctuality, appears to have been over-looked in recent years.



14.9. The Committee suggest the following composition for long distance and medium distance inter-city trains :

**For long distance trains**

13 Non A.C. Sleeper coaches  
4 A.C. Sleeper Coaches  
1 First Class A.C. coach  
2 SIRs  
2 Pantry cars

**Total**     22 coaches

**For medium distance trains :**

11 non-airconditioned chair cars  
2 A.C. chair cars  
1 Pantry car  
2 SLRs

**Total** 16 Coaches\*

**15.0. Design.**

15.1. The development of coach designs has not kept pace with passenger requirements. This is primarily because of the absence of any machinery between the Railways and the travelling public for interacting on the designs. The Railways do not elicit passenger reactions or undertake such surveys. There should be a cell in the Railway Board's Directorate of Tourism for ascertaining such passenger reaction on a regular basis. Every six months this cell could arrange to obtain passenger reactions e.g., by circulating questionnaires on the long and medium distance trains. These could then be systematically processed and fed to the production units with appropriate suggestions.

15.2. It would be useful, in this context, to draw up nice cards asking for suggestions based on the experience of the users in regard to designs of coaches, inclusive of amenity-fittings. The 'suggestion cards' used in prestigious hotels may be consulted. Lately, the Delhi Division of Northern Railway have developed a 'complaint card'. What we are suggesting here is the development of a suitable 'suggestion card' for designs of coaches and amenities provided therein for use by the Directorate of Tourism of the Railway Board for their periodical analysis and subsequent changes in the design of coaches.

15.3. While the above is being implemented, as an immediate first-step measure, the coach designs should be modified to provide for the following amenities :

1. Improving the ratio of toilet-to-passengers in a coach.
2. Providing increased water storage capacity.
3. Providing cool drinking water during summer by designing (electrical water cooling systems).

15.4. The Railways have introduced double-decker coaches, which are plying on a few sections like Bombay-Pune and Bombay-Kohlapur. These have not been successful or popular because of the suffocation felt by passengers and because of the nuisance of dirt, as the windows for the lower deck are almost flush with the platforms. The alternative of airconditioning them,

which could have resulted in convenient travel, has also not been found expedient. The Committee, therefore, do not recommend their adoption.

**16.0. Terminals .**

16.1. The Railways are Facing formidable problems with terminals, both in the case of passengers and freight. The introduction of additional passenger trains, particularly on the quadrilateral and diagonals would be very difficult without reorganisation and augmentation of the terminal capacity.

16.2. With the growth of the metropolitan cities no effective steps for setting up satellite or new terminals have been taken and the opportunity of acquiring land for creating such terminals is becoming progressively more difficult and needs to be vigorously pursued.

16.2.1. In addition, there are a large number of other growing cities, where also the problem is increasingly becoming acute, and in this context there already are fifteen cities, where the existing population has crossed half million mark. In half of them it is about a million and in some it is nearing two millions. Land acquisition in such cities for new terminals should be taken in hand atleast for planning purposes while there is still a possibility of getting suitable land.

16.2.2. Even if the Railways due to shortage of resources cannot acquire all such lands forthwith, the State Governments should be persuaded to earmark the required land-area for rail development in their land-use plans.

16.2.3. Fifteen towns have been identified where land acquisition is necessary for optimisation and development of passenger terminals, now or in the near future :

- |              |               |
|--------------|---------------|
| 1. Bangalore | 9. Patna      |
| 2. Hyderabad | 10. Varanasi  |
| 3. Ahmedabad | 11. Agra      |
| 4. Kanpur    | 12. Bhopal    |
| 5. Pune      | 13. Vadodara  |
| 6. Nagpur    | 14. Allahabad |
| 7. Lucknow   | 15. Amritsar  |
| 8. Jaipur    |               |

16.3. An important allied issue is to provide cheap road transport between more than one Railway terminals in the metropolitan areas for passengers changing over from one terminal to the other, or from one mode to the other. For this, effective co-ordination between the Railways and the metropolitan road transportation organisation is imperative. Lack of this appears to have created inconvenience in the Delhi metropolitan area on the introduction of the Ring Railway Service. The idea should also be to provide a combination of facilities, so that the inconvenience to the passengers may be removed or minimised and that transfer from one terminal to the other, or from one mode to the other, can be effected within minimum time and cost.

16.4. The question of new terminals also takes one to the problems being encountered in the existing terminals. One of the greatest bottleneck is the poor mobility on railway platforms. This is because all stations, particularly the large ones, are completely cluttered up by parcels traffic, RMS traffic, a large number of food vendors and trollies, books and magazine stalls and other miscellaneous items. The primary objective of

\* This can be augmented upto 22 coaches.



the Railways should not be allowed to be diluted and the cleansing operation of the existing platforms should commence. The Railways should explore how best to achieve this. The number of vendors for instance, at major stations should be reduced, if necessary even by increasing static units. Similarly, the whole business of parcels movement should be rationalised and passenger platforms cleared for the convenience of the passengers. This will also facilitate keeping the area clean.

#### 17.0. Parcels traffic.

17.1. The present system of clearing of parcels traffic and of mails is by the passenger carrying trains. This means that space, which can be utilised for passengers, is being lost to mails and parcels traffic. On safety principles, position of SLRs in each rake should be considered sacrosanct and they would suffice only for the baggage accompanying passengers. To optimise the number of coaches, which can be attached in a train, it is imperative that parcels and such other traffic are increasingly taken out and dealt with in separate but efficient streams.

17.2. Parcels congestion can be tackled in two ways : firstly, logistically, viz. by arranging booking delivery and handling of parcels in exclusive areas and by earmarking platforms for them : secondly, by organising the inter-city parcels express services to run like mail trains to clear the parcels and postal traffic.

17.3. As an immediate measure, such parcels express trains should be commenced on the quadrilateral and the diagonal routes, with the experiment being extended subsequently to other trunk and busy routes. It is however, appreciated that in the immediate future except where separate platforms can be earmarked for them, parcels express trains would have to use the existing platforms and the time-tabling would have to suit their availability. While this restraint has to be accepted in the short term; as a long term strategy, separate platforms should be earmarked or created for handling of parcels trains. In the case of the four metropolitan towns, planning for handling of such super parcel trains should be integrated with the planning for an additional coaching terminal.

17.4. The Railways should also encourage collection and delivery services for parcels, to begin with in the four metropolitan towns. This can be organised on the basis of parcels forwarding, or in the beginning by the Inland Transport Corporation recommended in Chapter V on Freight Transport.\* While this will be the beginning of the programme, the Railways, after having stabilised the first phase, should gradually expand the arrangements to major commercial centres on a time-bound programme.

17.5. The Committee have seen the Study Report on parcels traffic conducted a few years back by the Delhi Division of the Northern Railway. This Report made positive recommendations for reorganising and rationalising the movement of parcels over the northern-eastern region and also covered problems of inter city and inter-metropolitan movement of parcels traffic. Not many of the recommendations of this report have been taken up for implementation.

17.6. The recommendations made by the Operations Research Group of the Railway Board in 1980 have not

been found very realistic by the Railways as the study got involved with theoretical problems rather than the problems arising in the field; and the Railways have not implemented the recommendations of this Group either.

17.7 It is the view of the Committee that the movement of parcels particularly between major cities and metropolitan areas should be seriously studied, and for this purpose the Railways should immediately set up a Task Force comprising seasoned and knowledgeable experts. In the meantime, the recommendations made by us in this regard should be taken up for implementation for immediate results.

#### 18.0. Conclusions.

18.1. It is essential that the Government should adopt a policy of balanced growth of both passenger and freight transport on the Railways, without diluting the importance of freight. A correct appreciation of the principles of inter-modal split should govern the Railways policy on passenger traffic. Thus, long and medium distance and inter-city traffic should receive, during the coming years, overwhelming attention together with commuter and commuter-like traffic. As regards stopping sectional passenger trains, their further proliferation should be halted. On the quadrilateral and diagonals and other high-density routes such services should be rationalised for better performance and gradually scaled down.

18.2. As regards the specific programme of action, the Railways should take a number of steps in the introduction of inter-city and long and medium distance passenger trains, optimise the trailing load of such trains, and attend to issues pertaining to the composition, design, manufacture and maintenance of coaches and rakes. In this endeavour, the Committee have opted for a narrowing down of the speed-differential between passenger and freight trains.

18.3. The formidable limitations of terminal capacity for effectively handling passenger traffic during the coming years need to be remedied. Similarly, the movement of smalls traffic on the Railways needs to be substantially rationalised and streamlined.

18.4. Similar rationalisation in the movement of parcels and postal traffic is necessary and should be arranged on the basis of recommendations made in this Report.

#### ANNEXURE A.3.1.

(Cf. para 4.27)

#### 1.0. Inter-modal split of passenger traffic.

1.1. The Committee had the benefit of the Report of NTPC†, which had also gone into the question of energy efficiency of various modes of transport. For passenger traffic, NTPC largely relied on a consultancy study by NITIE\*\* in the computation of energy intensities.‡ NTPC had concluded that a single-occupant car has the highest energy consumption as opposed to the suburban train, which has the lowest. The energy

\* Para 16.4.

† National Transport Policy Committee 1980.

\*\* National Institute of Training in Industrial Engineering, Bombay.

‡ The expression energy-intensity measures the amount of energy needed to move one person over one kilometre by a given vehicle.



for propulsion purposes and non-propulsion purposes is indicated in Table 3.6 below.

Table 3.6

Comparison of energy efficiency of transport modes

Mode	Energy	
	Propulsion purposes	Non-propulsion purposes
	BTU/Pass. Km.	BTU/Pass. Km.
Electric traction	54.6	10.0
Diesel traction	151.2	9.0
Steam traction	1445.8	15.0
Diesel bus	288.7	29.0
Petrol bus	526.5	29.0

Source : NTPC Report 1980.

1.2. It would be seen from the table that electric traction is most efficient for haulage of passenger traffic. The advantage catapaults on considerations of environmental pollution and ecology. Depending upon the availability of resources, the Railways have, therefore, to opt for this mode\* increasingly.

1.3. NTPC studied rail and road costs. The rail cost was estimated for travel between two mofussil towns, and a mofussil and metropolis. NTPC further gave separate figures for broad and metre gauges and mail, express and passenger trains tractionwise. (Para 3.2.18 of NTPC Report).

1.4. Costs were computed for a distance of 1550 kms., for mail/express trains (capacity utilisation assumed at 100 percent) and 500 kms for passenger trains (capacity utilisation, 75 percent). User costs were computed from the data collected for a 'sample of passengers'. These costs disregarded time-saving value. The road costs were computed for the bus operation in the plains for a selected sample for travelling between two mofussil towns, and between a mofussil town and a metropolitan city with an utilisation assumption of 90 percent of bus capacity. NTPC found that the rail passenger resource costs were consistently higher than those of highway for a length of journey upto 500 kms. @ for which calculations were made.

1.5. NTPC have referred to the fact that the stopping passenger services are subsidised. (Para 9.8.3 of NTPC Report).

1.6. NTPC recommended that for distances upto 300 kms., traffic can be handled more efficiently by road.

and that the Railways should not *expand* these (the stopping) services and their dominant role should be to meet the demand for long distance passenger traffic.

1.7. This recommendation of NTPC follows recommendations made by the earlier Committees on Rail Transport more or less on the same or similar lines.

1.8. The Committee on Transport Policy and Co-ordination (CTPC) 1966 studied the road and rail cost data for freight traffic and highlighted the fact that upto 100 kms., road transport was generally cheaper (for freight traffic). CTPC said "In respect of passenger traffic also, as a mass carrier Railways are suited particularly for suburban and commuter traffic, where large number of passengers have to be moved within certain fixed hours to and from urban centres. Railways also constitute a more convenient mode of transport for long distance passengers.†".

1.9. CTPC clearly defined two categories of traffic being catered by the Railways i.e. commuter traffic and long distance traffic. The word commuter signifies in an extended manner inclusion also of the suburban-like traffic.

1.10. The Report of the Study Team on Railways, appointed by the Administrative Reforms Commission, November 1968, contained a positive recommendation that not more than one sectional passenger train was to be allowed on any section.\*\*

1.10.1. Lately in June, 1982 we got the point rechecked by the Rail India Technical and Economic Services (RITES), which conducted a multi-volume study on the subject as a consultancy for the Planning Commission on behalf of NTPC. Their observations were that with the large increase in diesel price the conclusions have not been materially diluted. This is evident from the following :

1. NTPC had stated that for a most efficient rail situation i.e. electric double line, rail operator costs at Rs. 7.76 per passenger for a distance of 150 kms would be about two times higher than that of road. If the road operator costs are re-assessed on the escalation of HSD prices (81-82 prices), it is found that the road costs have increased from Rs. 4.25 to Rs. 5.38. They still remain lower than the rail operator costs.
2. If the escalation of the relative unit operator cost is calculated by taking the growth in HSD prices as surrogate to general wholesale price index, the unit operator costs for highways increased to Rs. 6.68 and still remain lower than Rs. 7.26.

*Note.*—Updating has been done in respect of unit operator cost for road. The operator costs by the Railways are the costs of 76-77 and these also would have gone up. This, however, would only accentuate the difference.

\* This has been discussed in Chapter VIII on Railway Electrification.

@ NTPC's conclusions are reproduced below :

† "For every case we have studied, rail passenger resource costs consistently are higher than those of highway transport for a length of journey upto 500 kms. For example, even if we assume the most efficient rail situation, viz., electric double

line, rail portion cost at Rs. 7.26 per passenger for a distance of 150 kms. is about two times higher than that of road." NTPC Report 1980, page 37, para 3.2.20.

‡ CTPC Report, 1966, pages 29 to 31. Shri Tarlok Singh, on resignation of Shri K.C. Neogi, had chaired the Committee.

\*\* Chapter XIX, page 144, para 19.03(i)(c).



## CHAPTER IV

### PUNCTUALITY PERFORMANCE

#### 1.0. Introduction.

1.1. Punctuality is an indicator of the efficiency of an organisation and is a very important factor in determining the public image of the Railways.

1.2. About a crore of passengers travel daily on the Railways, as is evident from Table 4.1.

Table 4.1  
Passenger traffic in millions

Year	Suburban	Non-suburban	Grand Total
1978-79	2,113	1,606	3,719
1979-80	1,903	1,602	3,505
1980-81	2,000	1,612	3,612

1.3. A good proportion of the population thus comes in direct contact with the Railways every day. The punctuality of trains, therefore, is bound to leave a lasting impression on the public mind about the efficiency of the Railways. Even if the Railways are able to achieve spectacular results on the freight-front, its impact gets diluted by unpunctual running of Passenger trains.

#### 2.0. Unpunctual running.

2.1. The feeling that un-punctuality has become a habit is widespread. The claim of the Railways that most of the important trains are running to time has been disputed. Recently, a leading paper published a series of articles on 'Travails of Travel' in which late running of passenger trains in Bihar, East U.P., North Bengal and Assam was highlighted. Sufficient evidence exists, including our own experience while travelling by train, to indicate that a substantial proportion of trains do not run to time. It follows that punctuality statistics maintained by the Railways do not reflect a true picture in many cases.

2.2. Even the published statistics of the Railways indicate that on an average even among mail/express trains about 100 are late every day. Table 4.2 gives the position of mail and express trains.

Table 4.2  
Punctuality of mail & express trains

Month & Year	No. of mail express trains.	No. of trains lost time.	Percentage of trains not losing time.
<b>Broad gauge</b>			
January, 82	16,229	2,216	87.0
February, 82	15,447	2,221	85.6
March, 82	17,084	2,157	87.4
April, 82	16,537	2,085	87.4
May, 82	17,188	2,689	84.7
	83,185	11,368	86.4

\* Alarm chain pulling.

Month & Year	No. of mail express trains.	No. of trains lost time	Percentage of trains not losing time
<b>Metre gauge.—</b>			
January, 82	6,955	727	89.4
February, 82	6,007	687	86.6
March, 82	6,610	591	91.1
April, 82	6,463	705	89.1
May, 82	6,793	840	87.1
	32,828	3,560	88.8

2.3. The main reasons for loss of punctuality are failure of locos, trains running out of 'path' accidents, and miscreant activities like pulling of alarm chains and unauthorise disconnection of hosepipes. Table 4.3 fully indicates cause-wise analysis for mail and express trains.

Table 4.3  
(Figures in percentages)

Cause	Month (year 1982)				
	Jan.	Feb.	March	April	May
<b>Broad Gauge.—</b>					
Steam/diesel loco failure.	14.3	12.0	14.8	15.3	16.5
Elec. loco failures/ Elec. defects.	3.1	5.3	4.3	2.8	3.5
C & W failures	8.0	7.6	6.6	7.3	6.3
Precedence, Crossing, operating failures.	13.0	16.7	12.0	9.0	11.3
S & T failures	4.7	4.5	7.2	6.2	5.2
A.C.P.*/miscreant activities.	18.17	20.4	16.7	17.4	16.3
Accidents	14.4	13.2	13.0	11.0	9.6
Agitations	3.0	1.7	3.4	3.1	2.8
Other causes like rail breakage, Engg. restrictions, bad weather, rains, floods, OHF trouble etc.	20.8	18.6	21.0	27.9	28.5
<b>Total</b>	100.0	100.0	100.0	100.0	100.0
<b>Metre Gauge.—</b>					
Steam/diesel loco failure.	42.5	37.5	40.9	37.0	37.0
Elec. loco failures/ Elect. defects.	0.3	0.4	...	1.2	0.4
C & W failures	5.2	4.7	5.0	4.3	4.3
Crossings/Precedences of other operating failure.	18.0	16.7	14.1	11.6	15.0
S & T failures	2.6	2.2	1.7	2.8	3.7
A.C.P.*/miscreant activities.	7.3	10.6	13.7	7.7	6.3
Accidents	8.1	13.6	10.3	9.0	9.5
Agitations	0.5	0.9	0.9	1.0	3.3
Other causes like rail breakage, Engg. restrictions, bad weather rains floods, OHF trouble etc.	15.5	13.4	13.4	25.4	20.5
<b>Total</b>	100.0	100.0	100.0	100.0	100.0



2.4. No separate statistics are maintained to show the extent to which negligence or lassitude of railwaymen has contributed towards loss of punctuality. Lately, the impact of this has increased.

2.5. The Committee have been advised that today the main emphasis is on watching the punctuality of mail and express trains, though they are also not able to keep time. No special attention is paid towards ensuring punctuality of ordinary passenger trains. In respect of these services, the proportion of passenger trains losing time is comparatively higher, as can be seen from Table 4.4.

Table 4.4  
Combined broad gauge and metre gauge

Month & year	No. of ordinary passenger trains		No. of trains that run late		Percentage of trains not losing time	
	BG	MG	BG	MG	BG	MG
Jan., 82	40,817	30,221	9,429	5,289	76.9	82.5
Feb., 82	37,098	28,559	7,631	6,602	79.4	76.8
Mar., 82	41,036	31,379	8,608	6,717	79.0	78.6
Apr., 82	42,133	31,523	6,689	6,547	84.2	79.3
May, 82	43,652	30,223	7,451	7,094	83.0	76.6
151 days	204,736	151,905	39,808	32,249	80.5	78.8

On an average, on the basis of Railway records, 477 ordinary passenger trains run late every day.

2.6. Table 4.5 shows the average number of trains of various types of services run daily during 1980-81.

Table 4.5  
Trains run

Type of trains	Broad gauge 1980-81	Metre gauge 1980-81
E.M.U.	2,378	252
Mail/Express	517	212
Passenger trains/mixed trains	1,636	1,210

2.7. It is appreciated that the number of EMU services run with the total fleet is enormous *vis-a-vis* other passenger-carrying trains, and that by and large their punctuality is better and is not included in Table 4.4.

2.8. The proportion of number of passengers travelling in different types of services is given in table 4.6.

Table 4.6  
Proportion of passengers

	Proportion of total traffic passengers 1980-81
<b>Non-suburban—</b>	
Ordinary second class	37.1
Mail/express second class	7.2
	7.2
Upper class	0.3
Total :	44.6
Suburban (all classes)	55.4
Total (all passengers)	100.0

2.9. The above table clearly indicate that both the number of ordinary passenger trains and the number of passengers travelling in such trains are many times higher than the mail/express trains, and the passengers carried in mail/express trains. Equal stress must, therefore, be laid also on the punctuality of ordinary passenger trains that the Railways elect to run.

2.10. The practice today is to consider a train as punctual if it reaches its destination in time, notwithstanding the total distance involved and the number of halts. This does not reflect a true picture of the operational efficiency of the Railways. A train should be considered as punctual if it starts right time, reaches all the scheduled halts punctually and arrives at its destination on time. Only if such a concept is introduced would it make rail travel convenient for all passengers and ensure adequate attention to cleanliness of coaches, watering them, and removal of train lighting defects noticed enroute, which will not be possible if the scheduled stoppages of trains at intermediate points are curtailed in an attempt to make up lost time.

2.11. The punctuality performance is not uniform all over the Indian Railways. The position as recorded by the Railways is bad in the case of North Eastern, Northeast Frontier and Eastern Railways, particularly in the case of the first two. This would be clear from Table 4.7.

Table 4.7

Percentage of ordinary trains running punctuality (Year 1982)

Railway	March		April		May	
	BG	MG	BG	MG	BG	MG
Central	81.9	96.7	81.8	N.A.	79.1	N.A.
Eastern	75.6	...	77.1	...	76.3	...
Northern	82.6	93.3	81.5	94.8	80.0	95.8
North Eastern	55.5	54.5	57.5	55.2	67.4	57.6
Northeast Frontier	61.0	70.0	64.0	69.3	55.0	66.6
Southern	92.4	91.4	94.2	91.1	94.5	90.8
South Central	96.5	91.7	96.6	95.7	95.8	95.9
South Eastern	95.8	...	96.5	...	95.8	...
Western	86.6	90.8	85.4	89.8	82.5	96.0

2.11.1. Within a zonal Railway, there are certain sections on which arson and tampering with the running of trains are on a very high scale and incidence of stoppages of trains by alarm chain pulling and disconnecting of hosepipes are rampant. Some of the leading sections in this respect are indicated in Annexure A-4.1.

### 3.0. Remedial strategy.

3.1. It would be necessary to take special measures for bringing a permanent improvement in the punctuality performance. The recommended measures are outlined in the following paragraphs.

3.1.1. The present system of compilation of statistics needs improvement. The compilation of punctuality statistics should be arranged on the following basis :

1. A train is considered as not losing time on a particular zone or division if it is made over as many minutes (or less) late as taken over. This principle is not conducive to an improve-



ment in punctuality performance because it militates against the basic approach of making up time on the run. This should, therefore, be given up, except for the limited purpose of internal assessment of performance by a Zone or a Division.

2. Trains should be considered as running right time on a division or a zone on the same principle as it is considered on the entire railway system. This should mean that if a train is late at any point on a division or a zone it should be taken as having been lost in punctuality.

3.1.2. A study was made of the mail/express trains originating at the major terminals in Delhi area, viz. Delhi Main, New Delhi, Hazrat Nizamuddin, for January to May, 1982. This study (Table 4.8) indicated that 40 per cent of the trains are leaving the originating station with less than the prescribed composition.

3.1.2.1. Shortages such as indicated result in serious inconvenience to passengers. The previous practice of having standby coaches/rakes at the major terminal must be revived so that the trains are run with the prescribed composition. The provision of a standby rake would also enable long distance trains being run to time on occasions when the prescribed rake link becomes inordinately late. The present practice of watching the running of mail/express trains with prescribed composition suffers from serious organisational flaws. This is an organisational flaw in as much as it does not enable the system to recoup with any speed the shortage of coaches, which rakes place on the run due to various reasons. Under the present arrangement, the originating stations very often do not know what has happened to the coaches detached enroute at an odd station, and may be on a separate Division or even a separate zone. This deficiency should be remedied.

Table 4.8

Composition of originating and by passing Mail/Express trains ex. DLI, NDLS, NZM.

	Jan. 1982	Feb. 1982	March 1982	April 1982	May 1982
(i) Total trains left	1491	1344	1498	1444	1492
(ii) No. of trains left with full composition (percentage given in brackets).	865 (58%)	796 (59.2%)	854 (57%)	817 (56.3%)	910 (61%)
(iii) No. of trains left with one bogie short.	384	283	320	280	312
(iv) No. of trains left with two bogies short.	117	123	160	207	136
(v) Total No. of trains left with short composition (percentage given in brackets).	626 (42%)	548 (40.8%)	644 (43%)	627 (43.7%)	582 (39%)

3.1.3. The running schedules of mail/express and passenger trains are worked out by the Railways, with due consideration to the requirements of crossings and precedences and other parameters, as indicated later in para 3.1.8. This should be done realistically. Once, however, this has been done and the

time-tables have been published, the schedules should be observed scrupulously.

3.1.4. A substantial portion of detentions take place at the terminals because of inadequate capacity. When one or more trains run late and get 'bunched' a chain reaction sets in affecting the punctual running of the subsequent trains. If this is to be avoided, adequacy of terminal capacity is an absolute must.

3.1.5. Punctuality is also getting affected because of intensive utilisation of line capacity on the busy routes. The utilisation is in the region of 90 percent. Such a heavy utilisation does not permit the required flexibility for maintaining punctuality. With improvement in traction, signalling, telecommunication and management methods, it should be possible to optimise the utilisation of line capacity and when that happens on a particular route, the Railways should take 80 percent utilisation as the basis for planning augmentation of capacity.

3.1.6. It has already been stressed that the heavy arrears in replacements and renewals of track, rolling stock, etc. should be wiped out on a priority to avoid frequent track failures, imposition of speed restrictions, etc.

3.1.7. Loss of punctuality due to loco failures is indicative of poor maintenance and examination of rolling stock. This area requires special attention. There can be no substitute for improving the quality of maintenance in loco sheds and carriage and wagon depots. Improved maintenance practices along with modernisation of maintenance facilities should be planned at major passenger terminals and loco sheds on a phased and time-bound programme.

3.1.8. The punctuality performance is also being seriously affected on account of precedence and crossings etc. While this is partly due to unpunctual running of trains generally, it is essentially a function of differential in speeds. A slow stopping passenger train has to give way to a fast freight train or to a mail/express train. It is, therefore, necessary to reduce the differential between passenger carrying trains and the freight traffic at an optimised level. At the same time, it is also necessary to gradually scale down (not eliminate) the number of short distance stopping passenger trains. It is also equally necessary to run the freight trains according to a scheduled path and time table, which will ultimately result in fewer precedences and crossings for passenger carrying trains.

3.1.9. Another effort to reduce the non-passenger commercial activity on Mail/Express services, in order to improve their punctual running, could be to eliminate parcels booking on such services by reorganising the movement of such parcels in bogie parcel vans (VPs) between selected pairs of points with substantial parcel traffic and clearing them by parcel expresses on the trunk routes.

3.1.10. In metropolitan areas, where suburban and long-distance passenger traffic has peaking characteristics, it should be ensured that freight train scheduling recognises this factor and 'passenger blocks' enforced as in Bombay and Calcutta suburban sections. Here again, on a long term basis, to cater to the needs of growing traffic in future, additional sectional capacities must be generated, if necessary by providing separate tracks for passenger traffic.

3.1.11. Time-tabling refinements should also be considered. It has been proved time and again that



punctuality performance does not improve by building a 'slack' in the inter-sectional running time for providing traffic recovery time. This psychologically builds up a tendency to slackness, which is counter-productive. Engineering allowances also need to be computed on a more scientific basis and actual utilisation of this allowance analysed section-wise to enable realistic estimate to be made.

3.1.12. To the extent permissible under the law,\*\* the alarm chain pulling apparatus should be made temporarily inoperative only on vulnerable sections and on specified vulnerable trains, after taking all due precautions for dealing with any emergency warranting stoppage of the train. In this context, it may be mentioned that with the introduction of air-brake system (for example on the Rajdhani rake between New Delhi and Bombay), the pulling of the alarm chain does not result in automatic stopping of the train, as used to happen with the conventional vacuum system s, but gives a warning and gets reflected in a partial drop in pressure to the driver, whereupon he can apply the brakes. Such a system can be experimented on a few more rakes in respect of trains, which are repeatedly subjected to alarm chain pulling on particular sections.

3.2. The menace of alarm chain pulling, coupled with disconnection of hosepipes, takes a heavy toll of punctuality. This is a problem which has to be squarely faced both by the Railways and the State Governments, and satisfactory solutions found. The Railways, however, will have to intensify surprise and ambush checks,† but these alone will not eliminate the menace, and it will be necessary to have both punitive and juristic action. The Committee attach a high-degree of importance to the problem and are, therefore, studying it in depth. They propose to make detailed recommendations in a subsequent Report dealing with Railway Security. For the present, however, the Committee would emphasise the need for the Railways and the State Governments intensifying effective drives against alarm chain pulling and hosepipe disconnection in the vulnerable areas of the Railways (Annexure A-4.1).

#### 4.0. Conclusions.

4.1. The punctuality performance on the Indian Railways is admittedly poor, and the statistics compiled in this regard of limited reliability. The sanctity of running trains to time-table schedules needs to be restored, together with an infusion of punctuality-consciousness.

4.2. The Committee have made a number of recommendations in this regard ; these include changes in the method of compilation of punctuality statistics, running of trains with prescribed composition, improvement in terminal capacity, streamlining the pattern of maintenance, reduction in non-passenger commercial activities on trains and platforms, refinement in the preparation of time tables, and a concerted drive against alarm-chain pulling and such other interferences with the running of trains.

#### ANNEXURE A.4.1

(Cf. para 2.11.1.)

#### Sections vulnerable to alarm chain-pulling‡

##### Railway

##### Section

#### ASSAM

N.F. Railway Gosaigaonhat-Srirampur Assam-Path-sala Sarupathar, Lumding-Vhapar, Champarmukh Jn.-Lumding-Rangapanar, Crossing Serbhog-Barpeta Road, Nalbari-Kaithalakuchi.

#### ANDHRA PRADESH

S.C. Railway Guntur-Donakonda, Secunderabad-Nizamabad  
Secunderabad-Dronachallam  
Kazipet-Vijayawada, Kazipet-Balarshah  
Vijayawada-Rajahmundry  
Rajahmundry-Waltair.

S. Railway Arambakkam-Gudur-Ponpadi-Renigunta

S. E. Railway Waltair-Palasa

#### BIHAR

N.F. Railway Kishanganj Galgalia Barsoi Jn.-Kachna Katihar Labha and Manihari-Katihar

E. Railway Patna-Gaya, Kiul-Gaya, Mokameh-Danapur, Danapur-Buxer, Gaya-Karmansa Garwa Road-Dehri-on-Sone.

N.E. Railway Chapra-Thawe, Chapra-Barauni Jn. Chapra-Muzaffarpur, Muzaffarpur-Barouni Jn.  
Muzaffarpur-Nirmali, Forbesganj-Mansi

S.E. Railway Tata-Chakradharpur, Bhojudih-Gomoh

#### DELHI AREA

Northern Narela-Panipat, Bahadurgarh-Bhatinda Bijwasan-Rewari. Rewari-Hissar.

Central Palwal-Faridabad

Western Narnaul-Rewari and Ajarka-Rewari

#### KARNATAKA

S.C. Railway Shedbal-Hubli and Hubli-Guntakal

S. Railway Mysore-Bangalore

C. Railway Daund Jn.-Solapur Jn. Khurduwadi

#### KERALA

Southern Shencottah-Quilon-Trivandrum-Ernakulam.

\* A slack in running time signifies more time than required being provided for in the time-table by a particular train in order to make up for loss of time enroute. When there is a lot of slack available on a train and train runs to time, it cannot be received at the terminal much in advance and is detained in the area short of the terminal. It also kills the initiative of train running and control staff.

\*\* The Indian Railways Act 1890, as amended upto date, and other concerned laws on the statute book.

† The Railways should organise repetitive network checks like 'Operation Barauni' and such other operations arranged by them in the late Sixties.

‡Source : Directorate of Coaching, Railway Board.



<u>Railway</u>	<u>Section</u>	<u>Railway</u>	<u>Section</u>
<b>MADHYA PRADESH</b>		<b>ORISSA</b>	
Central	Jabalpur-Itarsi Jabalpur-Majhgawan Bina-Hoshangabad Itarsi-Jabalpur Katni-Bina	S.E.	Cuttack-Khurda Road, Barhampur-Khurda-Puri.
Western	Anas-Meghanagar, Nagda-Bhiwani Mandi Dharnaoda-Bina	S.E.	Howrah-Kharagpur
South Eastern	Bilaspur-Durg-Anup Pur-Katna	N.F.	Samuktala Jorai Adhikari-Siliguri Jn. Kachna-Radhikapur and Maida Town. Town.
<b>MAHARASHTRA</b>		Eastern	Sealdah-Ranaghat-Gedc, Ranaghat-Bongaon, Sealdah-Lalgola Barasat-Hasanabad.
South Central	Nizamabad-Purna	<b>UTTAR PRADESH</b>	
Central	Lonavla-Pune, Kalyan-Igatpuri, Punc-Daund, Daund Jn.-Solapur, Karjat-Lonavla.	Northern	Ghaziabad-Tundla, Tundla-Kanpur, Allahabad-Mughalsarai Shikohabad-Farrukhabad, Lucknow-Faizabad, Lucknow-Sultanpur-Jaunpur, Faizabad-Varanasi, Varanasi-Partapgarh, Rae Barcli-Allahabad, Lucknow-Shahjahanpur, Moradabad-Delhi, Moradabad-Saharanpur, Barcilly-Alighrah, Delhi Arca.
Western	Bombay Central-Gholvad-Bombay Central and V.T. Section.	Eastern	Gahmar-Mughalsarai, Chandauli-Majhwar to Chausa. Dildarnagar to Mughalsarai
S.E. Railway	Gondia-Bhandara Road, Nagpur-Chindwara.	Central	Jhansi-Kanpur, Majhgawan-Allahabad Dhaura-Karari.
<b>PUNJAB</b>		N.E.	Kasganj-Fategarh, Gonda-Gorakhpur, Gonda-Dudwa Br, Bhatni-Varanasi, Varanasi-Allahabad City Varanasi-Mansi, Ballia-Shahganj.
Northern	Ludhiana-Amritsar, Ludhiana-Firozpur and Ludhiana-Jakhal-Hissar.	<b>TAMIL NADU</b>	
<b>RAJASTHAN</b>		Southern	Madras-Arambakkam, Madras-Ar akonam, Ponpadi, Madras-Jolarpcttai, Madras-Villupuram, Tiruchi-Madurai-Tuticorin.
Central	Dhaulpur-Mania		
Western	Kota-Bhiwani Mandi, Kota-Dharnaoda, Kota-Jajanpatti Bayana-Fatehpur Sikri, Jaipur-Phulera, Alwar-Ajarka, Bandikui-Alwar, Kishangarh-Ajmer.		
<b>GUJARAT</b>			
Western	Sachin-Valsad-Sachin, Valsad-Surat-Valsad TV. Section. Vadodara-Ahemdabad Surat-Bharuch, Dahod-Anas Ahmedabad-Khed Brahma and Ahmedabad-Palanpur.		



## CHAPTER V

### FREIGHT TRANSPORT

#### 1.0. Introduction.

1.1. The performance of Indian Railways in the movement of freight is indicated in Table 5.1.

Table 5.1  
**Traffic Carried by the Railways**

Year	<i>(Figures in millions)</i>	
	<i>Total originating traffic carried by the Railways (in tonnes)</i>	<i>Total transport output produced in terms of net tonne kilometres</i>
1974-75	196.7	134,304
1975-76	223.3	148,200
1976-77	239.1	156,800
1977-78	237.3	162,700
1978-79	223.4	154,800
1979-80	217.8	156,000
1980-81	220.0	158,474
1981-82	244.7*	174,000*

(\*These are provisional figures)

1.2. The figures indicate a rise and fall in the total tonnes lifted by the Railways. In fact, in the above period, it is only during the years 1976-77 and 1977-78, that the Railways were able to fully meet the transport demand. During these two years, a large number of wagons had to be stabled for want of additional demand; but prior to these years and even subsequently it would not be correct to believe that the transport bottleneck did not exist or the Railways were able to meet the demands fully.

1.3. If the study is made right from 1960-61, it is apparent that demands have not been met fully. The performance is given in Table 5.2.

Table 5.2  
**Profile of rail borne traffic**

Year	<i>(in million tonnes)</i>	
	<i>Total originating traffic carried by the Railways (in million tonnes)</i>	<i>Total transport output produced in terms of net tonne kilometres (in millions)</i>
1960-61	156.2	87,680
1961-62	160.5	91,218
1962-63	178.8	100,693
1963-64	191.1	106,841
1964-65	193.8	106,570
1965-66	203.0	116,936
1966-67	201.6	116,607
1967-68	196.6	118,860
1968-69	204.0	125,140
1969-70	208.0	128,248
1970-71	196.5	127,358
1971-72	197.8	133,265
1972-73	201.3	136,531
1973-74	184.9	122,354
1974-75	196.7	134,304

1.4. Tables 5.1 and 5.2 indicate an upswing in 1980-81 as compared to the previous years.

1.5. The 1981-82 performance in freight transport (final figures), in terms of efficiency indices is likely to be much better, surpassing the previous best. This has been largely achieved by discarding inefficient locomotives and ineffective wagons, segregating the express wagon fleet with roller bearings and centre buffer couplers from the conventional type of wagons, forming them into rakes for carriage of bulk commodities such as food-grains, fertilizers, cement and coal, etc. end-to-end running through goods trains by passing intermediate yards, and cutting out a string of train examinations. In the process, while increasing the overall offtake of traffic, the Railways have somewhat neglected piecemeal wagon load and smalls traffic and served large users and concentrated demands, and for doing so have used the best part of the available equipment.

1.6. While the above may be considered an encouraging trend, there is need for some rationalisation for bringing about lasting improvements in flows and streams of throughput, and not only in pockets of areas, but also to help small industries and small users.

1.7. It is against this background that an attempt has been made to analyse the issues and problems pertinent to freight movement during the coming five year plans.

#### 2.0. Inter-modal split.

2.1. Both CTPC and NTPC have gone into the matter of inter-modal split between Railways and Roadways. A brief on their analysis and conclusions should be relevant in the present context, and has therefore been given in Annexure A. 5.1.

2.2. The role of the Railways in the context of increasing commitments for moving higher levels of freight in the coming years and the rationale for evolving an inter-modal split between rail and road has already been highlighted in Chapter I. The factors, which necessitate a clear delineation of the role of the Railways vis-a-vis road transport, are as follows :

1. Escalating cost of diesel fuel, which cost-wise affects road transport to the largest extent. Oil constitutes a large proportion of our total imports,
2. POL is a dying resource, with supplies from abroad not wholly dependable, and there are users for whom its conservation is essential e.g. Defence Forces, Air Transport, Tractors for agriculture etc.
3. Increased pollution risks involved in road transport.
4. Much higher rate of accidents and risk to life from road transport.
5. Crowding of roads and consequent inconvenience.



### 3.0. A transition.

3.1. The above factors, all of which cannot be quantified in precise terms, only illustrate the increasingly important role the Railways will be required to play in future in meeting the freight (as well as passenger) transport demands. The road share will operate predominantly in areas where it is the most economical.

3.2. Para 17.10, of the Sixth Plan indicates :

"As a long term goal, efforts will have to be made for the Railways to develop the capacity to clear (1) all train load traffic for long, medium and short distance and (2) all non-train load traffic (i.e. piecemeal traffic) for long and medium distances (except for certain commodities). This would broadly leave all short distance piecemeal traffic for the road transport.

3.3. Rail transport has a natural advantage in moving bulk goods (and passengers) over long hauls at low costs. The recommendation of NTPC to the effect that the Railways should increase train loads and run point-to-point trains to ease pressure on marshalling yards, and to improve wagon turn-round, has been accepted by the Government in June, 1982.\*

3.4. The difficulties encountered in moving wagon load traffic arises because of a fragmentation of the total transportation effort. The piecemeal loading in wagon requires smaller yards for collection, bigger yards for marshalling, then going through the same cycle at the destination. Thus, in an ordinary cycle, a wagon will go through four operations with possible longer detentions at either end. As against this, a rake load moves from point to point and if its detention at the terminals is reduced by bulk handling, there would be a drastic curtailment of the turn-round time, with much improved utilization of stock.

3.5. It follows that in case the wagon load traffic has to be moved in a big way, the fleet would require considerable augmentation. In addition, with vastly increased traffic, the whole system of going through smaller, medium and bigger yards would make management controls difficult and complex, thereby preventing the system from achieving optimality.

3.6. The transition from the wagon load to the rake load concept would have to be adopted by the Railways for bulk of the freight traffic for efficient running, to successfully meet the challenges of the future, and for the development of the economy.

3.7. The term 'wagon' in common parlance refers to four-wheeler wagon. The Railways have a large number of conventional four wheeler wagons both covered and open-lying in the circuit today. These wagons impose an inherent restriction on speed as they are not capable of being run at higher speeds. They also impose serious constraints on marshalling. With the transition from wagon to rake load, for over three-fourth of total national rail-borne freight, the Railways should now programme to phase out the four-wheeler,† and make the eight-wheeler bogie open or covered wagon the unit for

wagon load movement, which also will have an important role to play for around 15 to 20 per cent of the total freight.

3.8. Arising out of such a transition, the task of management will become simpler, as instead of concentrating on the movement of thousands of individual wagons, the management would largely concern itself with the movement of rakes in hundreds. The quantum-jump required can only be accomplished if the organisation and the uneconomic fats in dealing with both personnel, is made more compact and operation more optimised and where-withals and infrastructure are scientifically identified and pruned. Even for the wagon-load traffic, the movement should be rationalised and moved more efficiently, and for doing this specific recommendations are being made later.

3.9. A plan of action, is therefore, being suggested under which much of the present traffic in wagon loads might shed itself by establishing a network of nodal points, on a time-bound programme.

### 4.0. Aggregate demand profile.

4.1. An idea of the total quantum of traffic required to be lifted by the Railways, particularly in the next two decades or so, indicative of the range in which the demand is likely to lie has already been presented in Chapter I. The increase in net tonne-kilometres is estimated to be of the order of 222 percent. Such a quantum-jump will require a changed outlook and a multi-pronged approach.

4.2. The strategy for the coming years would require the Railways to fully exploit their natural advantage as becoming the mainstay of transport for bulk commodities, such as coal, iron & steel, foodgrains, fertilizers, cement, POL and mineral ores both for home use and for export. This roughly covers 86 per cent‡ of the traffic in terms of originating tonnage and 79 percent in terms of net tonne kilometres. This figure is likely to rise to 86.1 per cent in terms of originating tonnage and 85.6 per cent in terms of the total transport output as adjudged by the net tonne Kms. figure by 2000 AD. The movement, therefore, of bulk commodities, in the years to come would not only increase but by a very big margin. If economies of scale which imply 'wholesale movement's of traffic are not increasingly adopted, the Railways might get bogged down and might not be able to meet the challenge.

4.3. This would require a pattern in which trains for such bulk movements and traffic are run on 'a unit train concept'. To achieve this, the following steps would required to be taken :

1. Loading being done in block rakes without requiring multiple placements for breaking them.
2. A pattern of examination which will permit these trains to cover the lead without detentions en-route.
3. For such rakes intermediate yards would cease to have relevance for through movement.

\* Extracts from the Memorandum of the Planning Commission embodying the views of the Government and the Plan of action on the NTPC Report :

Rec. 9.4 Railways should increase loading in train loads and receiving of point to point trains to ease pressure on marshalling yards to improve wagon turn-round.

Views of Accepted.  
Govern-  
ment.

Plan of Ministry of Railways may take further action.  
Action.

† The Committee intend to work out such a programme in a later Report.

‡ Figures of 1980-81, Indian Railways,



4. Setting up a system of nodal-point network where such block loads would be handled again without requiring any breakage of the load.

#### 5.0. Loading strategies.

5.1. Presently loading of bulk commodities does not ensure the sanctity of the rakes. For example, coal, which is a major commodity and where during the last 10 to 15 years the sidings have been rationalised in a very big way, is being loaded wagon by wagon and is still not being loaded in block rakes. According to published statistics,\* the movement of coal in block rakes is of the order of 86 per cent. The figure in earlier years has been 15 to 20 per cent less. In other words coal is moving in piecemeal wagons to the extent of around 25 per cent.

5.2. The future trailing loads of freight trains have to be increased. This is necessary also to economise on ground capacity and rolling stock investment. It would be seen from the exercise done by the Committee, vide details contained in Annexure A.5.3 that the number of trains in terms of 4500 tonnes trailing loads would almost be half as compared to what is under the present system. The Committee uphold the basic strategy of running such heavier trains, depending upon the design of the wagon, which would permit maximum exploitation of the existing loop capacities in future. The possibility of increasing the trailing loads still higher should also be considered as the traffic develops, and on independent sections, such as the K-K line, it may be possible to run heavier trains even now.

5.3. Piecemeal movement of coal is taking place because it has not been possible to club the demands of the small and even medium consumers. These demands are sponsored by district authorities. The clubbing of such demands is possible if there is a system of coal dumps.† As the State Governments are sponsoring small quotas and as small traders cannot invest large doses of capital for undertaking movement in block rakes, the solution would lie in the responsibility for maintaining the dumps being assigned to the District civil administration or to Coal India. With the establishment of coal dumps the movement would take place in block rakes. This would also overcome the present problem of avoidable piecemeal loading. In the present system of functioning a few days in a month are earmarked for wagon loads being undertaken by the collieries. In case the requisite number of wagons do not become available on these specified days, full loading for piecemeal consumers does not take place. Justified complaints are made in large numbers on this score. Fuller satisfaction would be possible only when the coal dumps are established and managed by the District administration or by Coal India.

5.4. In such a system, particularly for coal which would continue to have the predominant share of freight traffic, the question of loading piecemeal would not be in the interests of the national economy nor of making

the best use of the Railway system. It will, therefore, be necessary to graduate to coal dumps§.

5.5. Besides coal, the other main bulk commodities are foodgrains, fertilizers, cement and iron ore. In all these cases, facilities for loading and unloading block rakes require to be developed. For example, for foodgrains, it may be necessary to go in for silos. In fact such an arrangement is common in all major wheat producing countries of the world.\*\* It may also be necessary to develop a similar system for cement. Further, sidings of adequate length to facilitate block rake loading should be developed. Presently, in the Punjab and Haryana, there are a large number of points, which are cleared for block-rake loading, but where the wagons still have to be placed in different sidings and joined together later to form a rake. Efforts should be made to gradually convert them into full length sidings.

5.5.1. For fertilizers, the position is slightly better, because atleast the new and bigger plants have been provided with suitable facilities. However, these are not enough, as block-rake loading is still being done on multiple placements. It is appreciated that in some of the old plants, difficulties likely to be encountered in the creation of such facilities would be considerable, but efforts ought to be made to have full-length sidings wherever feasible.

5.6. It is relevant to reproduce an extract from†† the Draft Document of the Fifth Five Year Plan :

"It would also be necessary for the main users of the Railways namely steel plants, power houses etc. to modernise their handling facilities to reduce detention of wagons. It is also proposed to confine railway operations to block rake movements between principal points and to effect further distribution through road transport wherever necessary. This will also have to be supported by a programme of building dumps/warehouses/silos to even out peak demands for rail transport. Certain studies about the likely pattern of coal traffic in the Fifth Plan have been undertaken by the Railways and the investment programme for the development of capacity will be reviewed in the light of these studies and in consultation with the user Ministries.

5.7. It is understood that on their part the Railways have been emphasising on the user Ministries and other concerned agencies the need for developing requisite facilities. While some action has been taken in this direction, e.g. rationalisation of coal sidings enough has not been done. It is unsatisfactory that the advice of the Planning Commission quoted above has not been taken seriously, and the industries have been reluctant to make any investments to improve matters. As this feature would be basic to the total operational strategy, there is hardly any scope for compromise. In the long run this is also in the interests of the users, as it would speed up their own operations.

\* Indian Railways 1980-81.

† Similarly, coal should not move by trucks over long distance due to the Railway's failure to move it, as has often happened in the recent past.

‡ This has been discussed later in Para 7.5.

§ In view of the importance of rail-borne movement of coal to the national economy, the Committee considered it desirable to set up a full-fledged Working Group on Coal Transport, and intend to deal with this subject in-depth in a later Report.

\*\* Depots, storages, godowns and silos would have to be located in the production areas for storing foodgrains so that movement can be organised uniformly throughout the year. It does not appear possible to expect the rail transport system with suffi-

cient capacity to move all the agricultural produce in a few months. The proposed system would also facilitate turnover of stored foodgrains in distribution areas.

†† Cf. Page 174, Para 7.20 of the Draft Fifth Five Year Plan, 1974-79, Vol. II, published by the Planning Commission. The National Development Council did not meet to deliberate on this Plan for about three years, and the Fifth Five Year Plan 1974-79 was in a way a mid-term appraisal of the Draft Fifth Five Year Plan, 1974-79. To quote from the Address of the Prime Minister to the meeting of the National Development Council on 24 September, 1976 (which is reproduced as a Foreword to the Fifth Five Year Plan, 1974-79), "The document which the Planning Commission has now presented to us is, in a sense, a mid-term review of the Plan."



## 6.0. Nodal points.

6.1. The nodal points should be equipped with the following :

1. Provision of a full rake-length siding\* to handle with mechanical aids a block rake and by large in one placement;
2. Adequate storage facilities\* (which is not an easy problem in certain commodities, such as fertilizers and foodgrains); and
3. Facilities to transport by road to the consuming centres within a radius of 100 to 150 kms.

6.1.1. The last feature would be in conformity with the logic of distribution by road for distances for which it is the proven correct mode and would also provide the interface between rail and road transport, which is absent today. The above measures would also overcome the biggest constraint existing in the freight operations today, namely the absence of properly equipped terminals. They would also reduce the turn-round time, of handling operations, and speed up deliveries. The investment of rolling stock and ground capacity would also, as a result, get reduced. The nodal points would have to be planned and created for bulk commodities. Such points do not exist today.

6.2. The cost of a nodal point, as computed today would be of the order of Rs. 5 to 6 crores which would cover the cost of a full length siding alongwith an extra line, platforms, sheds, storage facility, mechanical handling facilities etc. Evidently substantial investment would be required for creating these terminals. The question of having combined nodal points for handling of various commodities to economise on the investment would require detailed investigation.

6.3. The Committee have considered this limited question of combining the handling of foodgrains, fertilizers, cement and coal. Two problems are likely to arise. Firstly, these commodities are likely to sometimes get intermingled and cause contamination secondly, the dissipation points may vary from commodity to commodity. While in certain specific cases some handling may be combined, the chances of this being attempted on a large scale does not appear feasible. The nodal points will have to be determined in relation to the demand pattern. Ultimately these may have to be served by a dedicated fleet of wagons, on fixed routes, which would facilitate bulk movement.

6.4. The number of such terminals would have to be determined by the Railways, in coordination with the user Ministries. However, the Committee had broadly considered the problem. The figures in Table 5.5 may be indicative of the measure of the problem.

Table 5.5

### Requirements of nodal points—

Commodities	Numbers
Fertilizer Plants	130
Cement	80
Foodgrains	80

Note.—The above does not include the coal dumps or the existing Power Houses and other big users where facilities would also be required to be developed.

## 7.0 Coal.

7.1 This commodity constitutes the preponderant share of rail transport in the country, and this position is likely to remain unchanged in the future. According to the estimates made in Chapter I, even in 2000 AD, the share of coal in the total freight would be 45 per cent in terms of originating tonnage and 46 per cent in terms of tonne kilometres. Thus, nearly half of the transport effort would be utilised for meeting the coal traffic demands. A large proportion of the existing pattern of movement of coal is for big consumers such as power houses, steel plants, fertilizer plants and cement plants. In fact, together, this will account for almost 80 per cent of the total movement in coal. It should, therefore, not be difficult to create necessary facilities of nodal points in the existing sidings of such consumers. It should be stressed that if a compromise is made on this suggestion, larger uneconomic turnaround time and slow movement of coal would become unavoidable.

7.2 The residual traffic in coal would have to be catered by coal dumps. It is unfortunate that the idea of coal dumps has not taken root. Their establishment has got bogged down by a controversy as to who should operate these dumps, and how the costs for creation of the requisite facilities should be met. While the distribution of coal is a State subject, the States have been shy in taking over this function. Instead, they have been suggesting that Coal India Ltd., should maintain and run the dumps. The Coal India Ltd., and others have thus far been reluctant to do so because of additional operational costs and a direct 'Confrontation' with the consumers on the quality of coal, short receipts etc.

7.2.1 It is, however, now understood that a decision has lately emerged that Coal India Ltd., will maintain and operate these dumps. In other parts of the country, their sister organisations should take up the responsibility. Partly, the reluctance also stems from the fact that they have been demanding a guaranteed movement from the Railways for these coal dumps, which the Railways have not hitherto found possible under the existing system. The Committee consider that after the users have fulfilled the stipulated condition and have established the dumps, the Railways should undertake a guaranteed timely movement up to at least 80 to 90 per cent of the requirement.

7.3 Presently there are persistent complaints of consumers, whose requirements are in wagon loads. Such loading often becomes a casualty under the present system of loading of coal. A few days of the month are ear-marked for such loading and if wagon supply is not made by the Railways on these days due to any reason, or for wagons left-behind by the collieries, this loss of loading cannot be retrieved. As loading of block rake formations increases, the piecemeal loading from the same sidings would become almost impossible. Table 5.6 indicates the percentage of block-load movement to total traffic in coal.

Table 5.6

### Percentage of block load movement to total traffic of coal.

	1976-77	1977-78	1978-79	1979-80	1980-8
B.G.	86.2	87.0	82.0	72.2	86.0
M.G.	59.4	59.0	53.5	60.9	63.2

(Source : Annual Report & Accounts and Year Books.)

\* Even for major industries this is important. The Committee discussed the subject for fertilizers at both Gorakhpur and

Nagarkurnool and received a positive reaction.



7.4. The table indicates that during the years when the transport demands have been met satisfactorily, the movement of coal in block rake formations on B.G. is of the order of 86 per cent.

7.5. The only way to overcome the difficulties likely to be encountered by small consumers arising out of this practice would be to group the requirements of an area in multi-consumer rakes, a process which has been initiated but not carried to its logical conclusion, and which is only possible by the establishment of coal dumps in each District or, where necessary, serving more than one District, or having more than one dump in a district, depending upon the quantum of movement.

7.6. To sum up, the Committee recommend the following :

1. Creation of necessary facilities at the existing sidings of power houses, steel plants, fertilizer plants, cement plants for quicker handling of coal rakes.
2. Establishment of coal dumps depending upon the demand either District-wise or in smaller areas as necessary.
3. Establishment of coal dumps at major coal transshipment points, so that the block rakes are immediately unloaded on arrival and can quickly revert to the circuit. Mechanisation can give a hand to unloading and/or loading at coal transshipment points.
4. Ensuring consequent on 2 above, that coal moves in block rakes, and
5. The Railways should undertake a guaranteed timely movement of coal up to atleast 80 per cent of requirement.

7.7. It is important to note that seven commodities between them, viz. coal, fertilizers, foodgrains, cement iron ore, steel and POL, account for 85 per cent of the total rail-borne freight traffic of which coal alone is around 45 per cent. There are many issues pertaining to the movement and planning of coal which would require much greater scrutiny and consideration. In recognition of this fact the Committee have decided to submit a full report on coal later, after they have deliberated on this subject in greater detail (Cf. Para 5.4 ante)

#### 8.0. Steel.

8.1. The stock-yards were established many years ago; but after the initial fillip, further development has not taken place commensurate with the needs. The number of rail-fed stock-yards, which was 42 in 1975, has increased to 65 in 1982. The increase is not satisfactory. The question is whether the finished products should be moved to stock-yards in anticipation of demand, or the transportation output should be fragmented to suit piecemeal loadings of a commodity, which being produced in bulk, is both susceptible and economic to be moved in rakes.

8.2. The Committee are of the opinion that having regard to the transportation-tasks ahead, the channelising of finished products from the steel plants through

stock yards is a pragmatic solution. The existing stock-yards are very few for the size of the country. There have to be many more. Their network has to be developed in a coordinated manner between SAIL, TISCO and IISCO.\*

8.3. The stock-yards would thus become the nodal points for distribution of steel. They must also have a full-rake unloading facility and be equipped with mechanical handling aids by way of cranes etc. The existing stock-yards must also be provided with these facilities urgently wherever these do not exist.

#### 9.0. Fertilizers.

9.1. A study was made by a Task Force in 1979-80 in connection with the movement of fertilizers from Thal, Vaishet and Hazira Plants. This study was confined to the northern States of Haryana, Punjab and Uttar Pradesh, where the fertilizer requirements are very high. A total of 35 nodal points were identified, each handling 2.5 and 3.5 rakes per week by 1985-86.

9.2. The establishment of nodal points would have to cover the entire country for which a fresh exercise is necessary. As this exercise was done through an Inter-Ministerial Group, a similar group can identify the locations on an all India basis. Once this task is completed, which should not take more than six months further action by way of land acquisition etc. could start.

#### 10.0. Cement.

10.1. The cement industry is generally concentrated in areas with proximity to limestone deposits in Rajasthan, Madhya Pradesh and Andhra Pradesh, and has made no attempt to go closer to the consumption centres in the north i.e. the Punjab, Haryana and Uttar Pradesh. The freight-pooling system has also influenced the historical growth near raw material conglomerations, nearness to which in any case is more economical for ex-factory prices. The expansion-trends have not indicated any reversal. This is amply borne out by the increased leads of cement, which has gone up by 82 per cent in 77-78 over 60-61. The industry is also poised for a large growth because of its intimate interface with industrial and economic development.

10.2. The difficulty of movement is aggravated by the development of the industry in a big manner on the M.G. system, specially in Rajasthan. As the consumption centres are on the broad gauge, this requires transshipment. Large-scale transshipment creates bottlenecks. The future scenario, therefore, should attempt at moving the industry closer to the consumption centres in the North, and in the process achieve minimisation of leads. The above is subject to the availability of the raw material in the consumption areas; and sufficient evidence exists that large-scale deposits of cement-grade limestones are available in proximity of the consumption areas.

10.3. A rationalised plan for distribution to avoid any cross-movement of cement and to reduce the burden to the minimum possible can only be arranged with a system of nodal points, where the cement will be brought, stored and moved for distribution. In the case of cement, the concept of nodal point can be extended to cover transshipment points on a few major streams. This will imply that the nodal point would be created at the

\* The Committee have had discussions in this regard with the Ministry of Steel and their response to the question of having more stock-yards was favourable. They, however, mentioned that when a stock-yard will eventually receive material in a trailing load of 4500 tonne train, this may mean that the requirement for the area served by the stock-yard for a period will be received

at one go, and for the disposal of the same, road transport alone may not be adequate and that for sometime assistance from the Railways, in addition to road transport, would be necessary for future disposition. While there may be odd one-time help, the Railways cannot be asked to arrange such road-disposal.



transshipment point, so that firstly transshipment is avoided and onward distribution of cement is arranged by road, or fresh loading on the broad gauge is undertaken without causing detention to wagons of either gauge.

#### 11.0. Mutual advantages.

11.1. The establishment of nodal points should lead to advantages both for the industry and the Railways.

11.1.1. As far as the industry is concerned, these will provide increased availability of rail transport, in regular periodicity. This would enable the industry to optimise its production in an optimum manner throughout the year.

11.1.2. For the Railways, the advantages would be :

1. The turn-round period would be substantially reduced and to that extent, the Railways' performance standards would improve and investment on rolling stock would get reduced.
2. The management of the fleet would become easier.
3. The rail transport supply would find it less difficult to match the demand.

11.2. The investments required for the establishment of nodal points should be borne by the concerned party, namely the industry concerned, while the Railways should bear the cost for new design of wagons and investment on rolling stock, etc. In view of the economies, the Railways should offer concessional freight, as this will provide an incentive to the consumers, particularly the small consumers. It may be clarified that at the loading point also, requisite facilities will have to be created by the user to facilitate loading in block rakes, which should not be confused with the facilities at the nodal point.

11.3. To sum up, the Committee suggest the following plan of action :

1. Establishment of a Task Force for identification of nodal points for fertilizers, cement and foodgrains.
2. Establishment of a Group of Experts comprising representatives of the Ministries of Railways and Steel to work out a time-bound programme for the development of more stock-yards and of requisite facilities in the existing stock-yards.
3. Allocation of sufficient funds so that the scheme takes off and become a success.

#### 12.0. Pattern of examination\*.

12.1. The Indian Railway Conference Association 'Conference Rules' provide the basic documentation for the train examination patterns. This book was last issued in 1972, and surprisingly it does not define the term 'intensive examination.' It is in fact out-of-tune with today's movement in block-rake express fleet which caters or will soon cater for 80 to 85 per cent of the aggregate freight movement.

12.2. One of the objectives of such examination is to move wagons over longer distances without undergoing

midway checks, be it by way of handling in a yard or any other type of examination.

12.2. One of the objectives of such examination is to move wagons over longer distances without undergoing midway checks, be it by way of handling in a yard or any other type of examination.

12.3. The Study Team appointed by the Administrative Reforms Commission had also observed in 1968 that the patterns of train examination were not keeping pace with modernisation, and had suggested a schedule 300 miles (480 kms.) for four-wheeler stock and 500 miles (800 Kms.) for eight-wheeler stock. The intention was that no intermediate examination was required to be undertaken. This recommendation got bogged down somewhere and has not yet been implemented. This has been unfortunate.

12.4. To take a corporate view of the pattern of freight operation as also of the present rules, which enjoin end-to-end train examination, the first step has correctly been taken. What is further required to be done is to change the examination pattern to suit the operational flows on end-to-end basis. This would require action to be taken expeditiously in the following directions :

1. A system of maintenance, which would permit a movement pattern, allowing the wagons in a rake to roll over distances of 1,000 Kms. without requiring any examination, up to 2,000 Kms. with only one vacuum-upgradation and beyond 2,000 kms. with two vacuum-upgradations.
2. Creation of requisite facilities at the terminals for examination.
3. Development of wagon designs which will promote such movement-patterns and such train-examination systems.

12.5. There are two aspects allied with the pattern of examination affecting the achievement of faster throughput, which would be studied in a subsequent part in detail, but are being mentioned in passing at this stage, because of the intimate interface involved between faster throughput and the pattern of examination. Firstly, the quality of the material being used in sick lines and maintenance, and secondly, the standard of maintenance by the workshops, and the sicklines. The fact is that a major part of the large arrears of the fleet today can be ascribed to the inadequate capacity of the workshops, and also to some extent the poor quality of both material and workmanship. It would have to be ensured that the stock available on the system is in good shape.

12.6. Table 5.7 indicates the colossal arrears accumulated by the Railways.

Table 5.7  
POH position

		As on 31-3-1981	As on 31-3-1982
<b>Coaches overdue POH</b>			
B.G.	..	6,422	6,057†
M.G.	..	2,504	2,353†
<b>Wagons overdue POH</b>			
B.G.	..	1,04,326	1,05,458†
M.G.	..	18,203	18,959†

\* The Committee propose to discuss this subject in depth in a later part dealing with Maintenance and Production of the

rolling fleet.  
† Figures of 81-82 provisional.



12.7. Table 5.7 will indicate that the task faced by the Railways in this sphere is colossal, and that, if steps are not taken to put this right quickly, it would become virtually impossible to deal with the rolling-stock arrears later.

#### 13.0. Intermediate yards.

13.1. In the days of steam traction and movement from yard to yard, the Railways had developed small and intermediate yards every 130 to 150 kilometres between every two major yards. Broadly, the distance approximated the run during the prescribed duty hours of the running staff.

13.2. Even with the modernisation of traction, this practice did not materially change, and there has been no precipitate effort for revamping the entire matter of yard network on a route. Fortunately, only very recently some effort has been made in this regard.

13.3. As almost all the trunk routes are now gradually being switched over to diesel/electric traction, the question of rationalisation in the number and scope of small and intermediate yards should be taken up for a close scrutiny. While doing so, even though as much as 15 percent of the total traffic would move piecemeal, as much as 85 percent of the total freight movement will be in block rakes, which in the very nature of things should by-pass these small yards.

13.4. It should be possible to close down some of the small and intermediate yards on the Indian Railways, in view of the change in the pattern of movement, under which broadly around 85 percent of the freight throughput should be moving in block loads, by passing such yards. In respect of a number of remaining intermediate yards, it may not be necessary to work all of them round the clock. Thus, shrinkage of both staff and the lines should be possible and should be organised. The staff released would have to be re-trained to help the Railways in expansions and in other areas, where they may be required.

13.5. The exercise in the United Kingdom and other advanced countries has brought about very significant improvement in the turn-round by the elimination of small and intermediate yards. On SNCF in France, a large number of yards were abolished and replaced by one yard for each area of operation. It would appear that in the present pattern of operation in India, the detention to wagons in yards and terminals constitutes the major part of the turn-round time, and that, therefore, the rationalisation recommended would appear to be very necessary.

#### 14.0. Exchange yards.

14.1. An allied issue is the role of the exchange yard. Hitherto the Railways have been working on the exchange-yard concept for all big consumers, such as steel plants, power houses, fertilizers and cement plants etc., primarily with the intention of dividing the line of responsibility between the Railways and the user. In the process, a system has been developed which is 'not a least-cost solution to the total economy'.

14.2. Confusion arises in the usage of the terms, exchange yard, peripheral yard and terminal yard, oftentimes used in different senses by different parties or in different situations. It is necessary to distinguish these terms in the sense that these will be used hereafter. Exchange yard is a yard where all traffic in wagons going to any user is first received, and is sent subsequently by the locos of the user to the point of consumption. The user's traffic is similarly brought into the exchange yard, and then subsequently cleared by the Railways. The name used is because of 'exchange traffic between the user and the Railways'. The 'peripheral yard' refers to the yard on the periphery, and can either be an exchange yard or a terminal yard. By the abolition of exchange yards and creation of peripheral yards all activities will be in a common yard's which are at present taking place in two yards—one under the control of the Railways and the other under the control of the user. The recommended concept of a terminal/peripheral yard would refer to only one yard where all requisite movements pertaining to the user and the Railways would occur both inward and outward.

14.3. The exchange yard causes an additional 18 to 24 hours detention to the block rake in the process of going through the procedures of the exchange yards. The Khandelwal Committee\* clearly highlighted this aspect by stating that in the interest of achieving faster throughput and the turn-round of rolling stock, the inhibiting factor of the exchange yard was required to be done away with.

14.4. A few examples would be illustrative of the improvements brought about on the South Eastern Railway as a result of the implementation of Khandelwal Committee's recommendations.† For iron ore, the trains going to Rourkela, which were suffering an average detention of two to three hours in the exchange yard, the detention was brought down to 30 minutes when the trains were allowed to go through without any stoppage. It may be clarified that the reference in para 13.5 to the extremely heavy detentions in the yard is different from the detentions which take place in the exchange yard. The detentions of the former category refer to sorting and remmarshalling, whereas the detentions in the latter category refer to only an artificial break in the passage of traffic, because of a theoretical 'exchange of wagons'.

14.5. Similarly, by arranging direct reception of iron ore train from Bondamunda exchange yard into the Steel Plant yard, and by taking it on the high lines with the same railway loco and by bringing the rake back, another 20 hours of detention was cut down. The evaluation of the results of experiments made by the Khandelwal Committee is indicative of the substantial savings which should arise out of the abolition of exchange yards.

14.6. The Khandelwal Committee† have mentioned the impressive results obtained from the experiments of running a train from Rakshi through Bondamunda exchange yard to Rourkela Steel Plant and pushing it on the high line with two locomotives. This resulted in reducing the average detention to a rake in the exchange the average detention to a rake in the exchange yard by four hours, unloading the rake on the high line by

\* Khandelwal Committee—Report on Rationalisation of Steel Plant's Traffic—1974-75.

† Khandelwal Committee was constituted in 1974 by the Ministry of Steel & Mines. The terms of reference were 'Rationalisation of movement of raw materials from mine heads/washeries to the steel plants and of finished products/by products from the

steel plants to the destinations points with a view to running all traffic in bulk rakes, as far as possible; to examine the layout/working of the yards in the Steel Plants and connected railway yards to improve utilisation of assets; to consider and recommend other steps for removing other inbuilt difficulties which hamper efficient operation and to recommend solutions for reduction in the levels of finished stock with the Steel Plants'.



five hours and detention inside the yard by seven hours. The total saving was of the order of 270 hours for the rake.\*

14.7. Theoretically, even if the saving in the detention of a wagon is reduced by 12-18 hours, this would mean the saving per wagon (4-wheeler) of about Rs. 36,000/- per annum, on the basis of the earning capacity of a wagon at Rs. 150 per day  $150 \times 365 \times .6$ .

14.8. An issue which remains to be settled, is that of apportionment of cost of the peripheral yard. This apportionment does not pose any problem in the historical concept of exchange yards. However, in future the Railways or the Plants for that matter should not look at the problem from their own narrow point of view, but must adopt a systems approach and offer a least-cost solution based on which the apportionment of cost can be decided.

14.9. The Committee, therefore, recommend the following plan of action :

1. Abolition of the exchange yard for operational purposes in the case of existing users. To facilitate the change-over, this may be done gradually and in stages.
2. Adoption of a policy decision that in future no exchange yard would be created.
3. Creation of a peripheral yard 'as close to the logical end of the activity as possible within or around the premises of the user'. As far as movement by the Railways, both on outward and inward journeys, are concerned, the peripheral yard will be terminal yard for all purposes, except for depot placements and withdrawals.
4. Equipping the peripheral yard with the requisite number of receiving-cum-despatch lines within the work-site for reception and despatch of trains, with access to the tipping or other unloading sites to be provided.
5. Equipping these yards with the facility of examination for end-to-end running in the outward journey.
6. Gradually extending the system to major plants in the private and joint sectors, also as this will be in the interest of the economy.

14.10. While the above is a conceptual delineation, it is appreciated that the exact modalities of the implementation of the recommendations in respect of the plants already operative would have to be decided after consultation between the Railways and Steel Plants and the Industry, separately for each plant, keeping in view the geographical, locational and other relevant factors.

#### 15.0. Wagonload traffic.

15.1. The need for organising rake-load running has already been emphasised. The manner in which the concept of a piecemeal wagon, requiring repetitive handling in yards, acts as a restraint against quicker movement of throughput has also been discussed.

15.2. Essentially, the problem of piecemeal movement, as seen presently and in the foreseeable future, is likely to be limited to the 'general goods traffic' like vegetable oil in tins, paper, glass wares, hessian cloth, refrigerators, cycles and cycle parts, sugar, pulses, lubricating oil etc. Piecemeal traffic will also include zinc, copper, lead, tin, tin-plate etc. which are costly commodities, and cannot move in rake formation. The bulk commodities such as food-grains, fertilizers, coal, iron ore for export, raw material to steel plants, and POL are already being canalised through public sector units and are susceptible to movement in unit formation.

15.3. The problem is of a limited nature of meeting about 15 per cent of the traffic demand and the Railways should take this movement also in their stride for the sake of the small consumer. While the Railways must do justice to the 85 percent of the traffic, which will move in bulk and meet such demands fully, they will at the same time have to do justice to the remaining 15 per cent traffic, in the overall interest of national economic development.

15.4. While the Railways would permit the loading of such commodities by industry in wagon-loads, they will themselves undertake the responsibility of ensuring, to the extent practicable, their movement in rake loads over the longest possible distances. This will require the following :

1. Rationalisation at the loading stations by arranging such loading on specified days for particular stream or direction.
2. Organising loading in such a way that a number of stations on the same section or adjacent sections can throw up a rake-load from a focal yard. These rakes can then be moved to another focal point at a distance, from which wagons can move piecemeal to a string of stations on the same section or on adjacent sections. As necessary, the empty rake can again move as a rake from one focal yard to the other.

15.4.1. Similar other expedients should be explored by the Railways constantly. The idea is that the Railways should try to achieve rake running of even wagon-load traffic to the maximum extent practicable, and in doing this, while the wagon-load traffic will have to move piecemeal, such joining up will make it move with greater speed.

#### 16.0. 'Smalls' traffic†.

16.1. The Sixth Plan‡ has outlined as a policy the role of the Railways in respect of non-train load piecemeal traffic. It has been clearly stated that the Railways will have to develop sufficient capacity to cater to such traffic for long and medium distances. The short distance non-train load traffic (piecemeal traffic) will have to be catered by road and customers would also prefer the road for such traffic. In conformity with this strategy prescribed by the Government in the Sixth Plan, the Committee recommend the following :

1. Specification of selected stations, where the facility for booking of smalls would be made available.

\* Annexure III of Khandewal Committee's Report on Rationalisation of Steel Plant Traffic for Rourkela Steel Plant.

† a smalls consignment is any consignment that constitutes less than a wagon load.



2. Organisation of loading on nominated days so that the Railways can club such traffic and form wagon-loads and sometimes even rake-loads in a focal yard.
3. Linkage of booking of such traffic with collection and delivery services or freight-forwarding services at the metropolitan and major commercial points so that while the facility of booking 'smalls' at 'smalls' rate is not denied to the people, the Railways can endeavour to club such traffic into wagonloads.\*
4. Linkage of such traffic on container, borne movement on as many routes as possible from the metropolitan and major commercial centres of the country.

16.2. The Railways should explore the matter further, so as to devise additional scientific expedients for satisfactory booking and movement of such 'Smalls' traffic.

16.3. While trying to see that the movement of genuine 'smalls' takes place, Government have to make sure that commodities, which *can* move in wagon-load or rake-load are not allowed to move in 'smalls', and rules must be framed to eliminate such practices. This will apply particularly to bulk commodities like coal.

16.4. The Committee would recommend that an Inland Transport Corporation may be set up, which will look after organised collection, movement and delivery of wagon-loads and 'smalls' traffic (and parcels) that have, of necessity, to move on the Railway system, despite the maximum practicable bulking of traffic into wagon/rake loads. This Corporation could in the beginning look after such services only at the four metropolitan centres and a few selected major commercial centres like Kanpur, Bangalore, Secunderabad, Pune and Ahmedabad. This Corporation should not be mixed up with the Container Corporation that has been envisaged in the next chapter while dealing with the containerised movement of national and international freight traffic.

16.4.1. Of the acceptable smalls traffic, beyond the scope of the Corporation, the Railways would have to move 'piecemeal' as expeditiously as practicable. Having said this, it has to be emphasised that it will be improper for the Railways to move their own traffic in 'smalls' and piecemeal wagons in short-lead areas. They should organise the movement of such traffic also as for instance in Delhi area, Bombay area, Madras area, Calcutta area, etc., by road. Such invidious rail-borne movement in concentrated rail network has come to our notice. The Railways must practise what they preach. Such movements have been found to be not only time-consuming, but very uneconomical.

#### 17.0. Present efficiency parameters.

17.1. The preceding discussion has been based on future, strategies. It does not deal with the day-to-day problems.

17.2. Before passing on to the malaise in the present operational framework, it is necessary to have back-

ground of the generally acceptable efficiency parameters. These are :

1. Wagon Kms. per wagon day
2. Net tonne kilometres per wagon day
3. Turn-round
4. Speeds
5. Average train load
6. Engine Kms. per engine day in use
7. Detentions to wagons in yards.

17.3. These statistics from 1950-51 to 1980-81 are given in Annexures A-5.2 and A-5.3.

17.4. From these Annexures it will be seen that in respect of wagon Kms. per wagon day, NTKMs per wagon day, excepting the years 1976-77 and 1977-78 the trend, if anything has been downwards. The same is equally true about engine utilisation. On speeds, there is a virtual stagnation.

17.5. Surprisingly, if this trend is compared with the experience of Soviet Railways, the improvements in speeds, turn-round, wagon Kms. per wagon day etc. from 1923 to 1955, the period being selected after the investment failures of the 1930s having created a crisis on the system, it is evident that on the Indian Railways the improvements look rather lukewarm.

Table 5.8

#### Performance of Soviet Railways†

	Turn round (in days)	Wagons Kms. per day	Kms. per locomotive day in use	Average speed Kms. per hr. in- cluding stoppage
1923	17.1	48.0	107	12.5
1930	9.34	89.5	153.3	12.2
1940	7.31	139.9	255.1	20.3
1950	7.49	146.3	246.3	20.1
1955	6.23	N.A.	293.3	24.7

17.6. The Chinese experience‡ is similar. The Chinese Railways are achieving a turn-round of 3.5 days currently and carrying 1095 million tonnes of traffic, producing a total transport output of 559 billion net tonne kilometres.§ There are marked differences between the Indian Railways and the Chinese Railways. The passenger traffic on the latter is negligible as compared to the former, and the latter have only eight-wheeler stock. Disciplinary environments differ widely.††

\* The freight-forwarding or the collection and delivery agent will, however, offer such traffic to the Railway at wagon-load rate and the differential will be his margin of profit.

†† It has not been possible to update these figures due to non-

availability. Hence current figures have not been given.

‡ The Report of the Railway Team which recently visited the Chinese Railways.

§ Figures are for 1979.

† This is also true in a comparison with Soviet Railway.



However, the above statistics only are indicative of the capabilities of a rail transport system, given the environment and the investment. In a limited way this was seen on the Indian Railways during 76-77 and 77-78.

17.7. Evidently, many present-day procedures require to be changed. Take for instance a yard, which is one of the most important nerve-centres of operations. As it deals with a large number of wagons, the quickness with which this done, determines productivity. It can also act as a constraint if it is unable to receive trains as they come and to handle them with promptitude. The performance of the biggest yard on the Railways, and probably in Asia, where both the up and down yards have been mechanised, i.e. Mughalsarai, is worth looking at. It is illustrated in Table 5.9.

17.8. The yard is dealing with less Wagons but with increased detentions. The story is not very different in the case of number of other yards. The Committee, during their visit to Mughalsarai, were advised that one of the reasons for the present trend of detentions was the lesser materialisation of wagon-load traffic with increased almost overriding emphasis on block-rake formation which necessitated increased detentions to wagons for forming of proper loads. While this is certainly one of the reasons, which is currently applicable, if the trends from 1967-68 to 1973-74 are studied, it would be found that the detentions have been going up. The detentions had come down in 1976-77 and 1977-78, but again started going up.

Table 5.9

## Performance of Mughalsarai yard

Year	No. of wagons dealt with	No. of wagons dealt with per shunting engine hour	Average detention (hours)*	
			Through loaded wagons	All wagons
1967-68	1,198,474	N.A.	25.6	24.3
1968-69	1,154,363	N.A.	27.0	26.2
1969-70	1,150,339	N.A.	32.2	31.1
1970-71	944,543	N.A.	32.6	33.2
1971-72	1,007,930	8.82	35.3	34.0
1972-73	997,583	8.36	41.1	40.7
1973-74	820,604	6.74	55.4	54.9
1974-75	927,575	7.53	51.6	51.2
1975-76	1,059,924	8.25	47.4	50.4
1976-77	1,054,949	9.61	36.3	37.8
1977-78	1,049,344	9.48	42.4	43.7
	887,778	8.37	49.7	50.7
1979-80	753,207	7.00	56.4	57.5
1980-81	780,650	6.39	56.8	59.3
Percentage over 1967-68	(- )35%	(- )27.7%**	(+ )121.9%	(+ )144.0%

\* These do not include through or bypass loads which are not dealt with in the marshalling yards.

\*\* Base year 1971-72.

17.9. To ensure optimum utilisation of the line capacity of a section and faster throughput, it is necessary that goods trains are run on the scheduled time-tabled paths. This recommendation has been made by almost all the other Committees, but somehow, has not materialised.

17.10. An allied issue is the elimination of speed-differential between freight and passenger trains. This acts as a drag on the line capacity. The Committee have already recommended in Chapter III on Passenger Transport that the future speeds of general passenger carrying trains should be pegged at 110 Kms. per hour. At the same time, it is necessary that the freight train speeds are raised upto 100 Kms. per hour, so that this differential is reduced and it becomes possible to run more trains with the existing line capacity.

17.11. For improving the speeds of freight trains, the Railways will have to take many steps. They will have to phase out the 4-wheeler and the steam traction, as separately recommended, also take to improved design of rolling stock.

17.12. It appears that a large number of other factors are also vitiating the functioning of the yard and contribute to the slower tempo of movement. Some of the basic constraints, which are impeding efficiency in large areas are mentioned below :

1. In the present system of functioning, the man incharge of the yard has no control over the ancillary services such as train examining staff, shunters, telecommunication, yard lighting etc. The result is that while he is responsible for the output of the yard, in fact, he has no network-control on its functioning. It is, therefore, necessary to take steps to put all the staff working in the yard complex under the overall command-control of one authority by upgrading† the post of Chief Yard Master to that of an Assistant Officer, so that a unified chain of command works and a person, who is vested with the responsibility of the functioning of the yard, is also given the wherewithal to achieve it.
2. The modernisation of yards is being talked of by way of mechanisation. Mechanisation in the Indian context means putting a few retarders which also are not effective enough to control all the wagons and ensuring that no damage takes place. A lesson to be drawn is that either a thing has to be completely done or not done at all. In this connection, the Chinese example is worth emulating. The yards they have mechanised not only have multi-stage retarders, control of speed of wagons, communication between shunting engine, driver and yard supervisor etc., all of which permit them to eliminate bumping. The engines on the hump in the mechanised yard have got cab signalling and radio telephone so that efficient two way contact is available all the time. The result is that there

† This should not be done by new creation but adjustment of matching surrender in Class IV, III, II or I categories in any discipline.



is no occasion for having to stop humping or wagons getting bumped. It will be useful to take up about a dozen key and vital yards with the requisite traffic load for such complete mechanisation.\*

3. The yards are supposed to work throughout the night, but the lighting arrangements are inadequate. They are dimly lit and do not permit functioning during night time in an efficient manner. Yet surprisingly all the yards are considered as having been adequately lighted. This must be rectified.
4. The staff in the yards is inadequate because of shortages, delays in recruitment and non-availability. It is either housed at far-off places and has no means of transport or if housed nearby, which is generally far away from local town, serious problems for schooling, marketing etc. arise. Both-ways, it is not conducive to efficiency. The Railways should endeavour to take remedial measures in both directions.
5. There are other minor matters, such as performance of the shunting locos, change of crews, etc. which also require to be improved.†

#### 18.0. Control.

18.1. Another nerve centre for operations is the 'Control'. The Committee have been told by senior officers both in their oral evidence and in their written statements that the calibre of the Control has deteriorated to such an extent that the real objective for which the 'Control' was set up is not being met. Historically, this dilution has taken place because of the loss of the pre-eminent position 'Control' enjoyed earlier. In the past, the Chief Controller was a very important figure and all the other senior supporting staff were under his sway. They also usually drew less emoluments in comparison.

18.2. Now all the Departments have been equalised with the result that the Chief Controller is 'one amongst equals' and, therefore, finds himself in a perpetual struggle. Even in the 'Control' his supremacy has been challenged as for instance, the Chief Power Controller no longer works under him. Within the Control itself, the person heading the Control Organisation should exercise control on the Power Controller, Commercial Controller, Train Examination Controller and other departmental representatives. The pre-eminent role of the Chief Controller has to be restored, in the interest of smooth operations.

18.3. To achieve this effectively, the Chief Controller in all major Offices should be an Assistant Officer and this should invariably be arranged without creation of any post, and by upgradation, by a matching surrender from another category of discipline, from class, IV, III, II or I.

18.4. The calibre of the Control and yard staff in general has also to be improved. This can be done only if reservation in promotion is not applied to 'Control' and 'yard' categories, as wrong decisions taken in the 'Control' and 'yard' can and do lead to disastrous consequences not only in punctuality and operation, but also in the safe running of trains. This must stop.

18.5. It is not possible to cover all the field-practice of a complex system. Therefore an attempt has been made only to analyse the major organisational flaws in the functioning of a yard or control office. The urgency for the establishment of a unified chain of command in the yard and the control by vesting the overall control over the other departments affecting operations, to the man in charge cannot be overemphasised. This may be arranged by the Railways forthwith.

#### 19.0. Speeds.

19.1. The speeds continue to be slow and have defied the effect of all modernisation on the Railways. The veracity of the published figures is also doubtful, as the speeds are calculated section-wise, which usually span major junctions and in the past coincided with steam engine runs which had to be much shorter as compared to diesel or electric locomotives. In this process, firstly the detentions, which are taking place at the ends, are not always reflected in the speeds, thereby not giving any idea of the effective speed at which the trains are moving. There is a case for calculating speeds of goods trains by taking their departure from the originating yard and the total time taken upto the arrival at the destination.

19.2. In the future scenario, the emphasis will shift to the running of block-rake formations and in this context, the statistics being suggested would prove extremely beneficial, as it would be indicative of the time being taken by rakes between origin and destination. As some other stock would move in the conventional manner, speeds could be analysed separately for point-to-point block-rakes, where the yards would have no role and for sectional stock, which will go after sorting through intermediate yards. For point-to-point loads, speeds will also have to be maintained on an all-India basis and not only zone-wise.\*\*

19.3. The reason why speeds have not improved at all is also that the present rules permit larger payment for less efficiency. If a driver/guard stays on line, he is likely to earn more money. There is no incentive for taking train faster and reaching the destination quickly or in time. The rationale of running allowance rules today appears to be that if a driver completes a run of 100 Kmph. in the target time of four hours or in three hours or in five hours he gets the same running allowance. The anomaly is that there is no incentive for quicker movement and there is no disincentive for taking longer time than the target. A very hard look is required at this payment, as this is cutting at the very root of the productivity of the system. In the past, there used to be positive incentive for going faster, though no disincentive for going slow. The Committee recommend a restructuring of running duty allowances with an inbuilt incentive for efficient running and an inbuilt disincentive for lethargic running.

#### 20.0. Conclusions.

20.1. A change in the appreciation of the concept of intermodal split is called for. The Railways may exploit the inherent strength of their network for movement of long-flight and bulk traffic. In this endeavour, the Railways may, in addition to separating the express fleet from the rest, also take steps, in coordination with the concerned Ministries, to establish the requisite number of nodal points, simultaneously graduating to appropriate mechanical loading and unloading devices.

\* Let the Railways start with Mughal Sarai Kanpur, Juhi and Bhusaval.

† Certain network-studies for individual yards on Delhi Division conducted a few years back proved useful to tone up performance. Similar studies should be undertaken for all major yards.

\*\* The Committee will again discuss this subject later when it takes up an appraisal of railway statistics and costing.



20.2. In keeping with the requirements of an uninterrupted flow of such traffic, a shift is also required in the concept and usage of both intermediate and exchange yards as also in the philosophy and practice of train examination. These are also necessary in order to reap full benefits from the investment on infrastructure and rolling stock, as also rationalisation and optimisation of movement, loading and unloading practices.

20.3. The present system of movement of wagon-load and small traffic is inefficient. This needs to be rationalised and substantially improved. For this purpose, *inter-alia*, an Inland Transport Corporation may be set up and assigned the responsibility of scientifically handling this traffic, to the mutual advantage of the Railways and the users, to begin with in the metropolitan and important commercial centres.

20.4. At the same time, the four-wheeled wagon may be gradually phased out, to give place to the bogie covered or open eight-wheeled wagon as the unit of movement for such traffic, just as the rake should be the unit of movement for bulk and long-distance traffic.

20.5. The Railways should move energetically towards optimising the trailing load and use of dedicated fleet of wagons on high-density specified routes.

20.6. The importance of the control and the yard complexes needs to be restored. In this context, a unified chain of command should be established, giving the man in charge the overall control in operation on all services in the network.

#### ANNEXURE A.5.1

(Cf. para 2.1.)

#### Inter-modal split of freight traffic Report of CTPC

Essentially the problem involves determination of a suitable inter-modal mix to suit the best interests of the society on least cost basis. Such an attempt was made in 1966 by the Committee on Transport Policy & Co-ordination (CTPC).<sup>\*</sup> The Committee studied the costs of transport both for rail and road. They pointed out the inadequacy of data, particularly for the latter, where they had to resort to a pilot study of three road transport corporations. They also relied on a Report of the World Bank Study Team on Coal Transport. The relevant figures from the World Bank Report are reproduced in Table 5.3.

Table 5.3

#### Cost of haulage of coal per tonne to the economy

Kilometre	Rail costs		Road costs	
			13-ton tractor and semi-trailer†	19-ton tractor and semi-trailer†
	Rs.		Rs.	Rs.
100	7.47		6.14	3.71
200	9.36		10.38	9.61
300	11.25		14.16	13.18
400	13.14		18.62	17.28
500	15.03		23.09	21.24

\* Shri K.C. Neogi was the Chairman of the Committee. On his resignation, Shri Tarlok Singh, formerly Member, Planning Commission, became its Chairman. The report was submitted in January, 1966.

† The trucking costs are based on a return trip with 25 percent empty haulage.

Table 5.4:

#### Comparative rail and road costs

(Rupees per tonne)

Distance (Kilometre)	Rail costs				Road costs	
	Bulk commodities		Light merchandise		13-ton tractor and semi-trailer	8-ton trucks
	Broad gauge	Metre gauge	Broad gauge	Metre gauge		
50	6.53	7.59	14.86	17.73	5.67	9.76
100	7.35	8.93	16.02	19.67	9.72	17.12
150	8.18	10.28	17.18	21.62	13.27	23.22
200	9.00	11.62	18.34	23.56	16.60	29.56
250	9.83	12.97	19.50	25.51	19.88	35.35
300	10.65	14.31	20.66	27.45	22.59	42.16
400	12.36	17.00	22.98	31.34	29.85	55.77
500	13.95	19.69	25.30	35.23	37.10	69.38

The Committee concluded, on the basis of Table 5.4, that the road costs for a 13-tonne tractor-trailer were higher than rail costs for bulk movement at and above 100 kilometres on both the gauges i.e. broad and metre gauges.

From Table 5.4, CTPC indicated that for light merchandise, Cost of road transport in 8-tonne trucks were lower than cost of haulage of light merchandise by rail up to a distance of 50 kms. on the B.G. and 100 kms. on the M.G.

#### Report of NTPC.

NTPC dealt with the question of the determination of inter-modal mix of traffic in greater detail. The primary consideration was the minimisation of the resource cost. NTPC, on the basis of the studies commissioned by them, have concluded that most commodity movements are economical by road for shorter hauls up to 300-350 kms. beyond which range the cost advantage lies with the Railways.

It appears necessary to go into the methodology of NTPC. For freight traffic, the study was entrusted to RITES<sup>①</sup> and resource costs were computed after making the following adjustments :

1. Taxes and duties were excluded.
2. A premium of 25 per cent was applied to exchange rate for imported components.
3. Economic cost of electric power was taken as R. 0.20 per kwh.
4. Accounting rate of interest was taken at 12 per cent per annum. For calculation of depreciation, the same rate was applied by using sinking fund approach.

<sup>\*</sup> Table 8, of CTPC Report, 1966.

<sup>①</sup> Para 3.2.15, of NTPC Report.

<sup>②</sup> Rail India Technical & Economic Services Ltd. did the study for them. Under an UNDP assistance, the study in fact was commissioned by the Planning Commission to RITES for NTPC.



5. Wage rate was not shadow priced.

6. Capital cost was assessed at 1976-77 process.

NTPC determined the break-even points for certain commodities for road and rail movements. This was done for block loads and wagon loads separately, both for diesel and electric traction. The general conclusion was that most commodity movements were economical by road for shorter hauls up to 300-350 kms. beyond which the cost advantage was with the Railways. This, however, did not apply to the high-value commodities such as fertilizers, foodgrains, coal, cement, etc., the cost advantage for roads was only upto 200-300 kms.

The cost between diesel and electric traction for the Railways was also analysed for bulk commodities, and it was found that the saving on electric traction increased with the distance covered. The higher the distance, more was the saving. The analysis also highlighted the desirability for the Railways going in for increased electric traction.

The cost contained two parametres, viz. the user cost and the operator cost. If the operator cost alone were studied, the break-even point between road and rail was observed at 50 per cent reduced distances generally than in the case of total cost. While operator cost is an important determinant, the relative total costs are important for this purpose.

The cost data becomes the rational plan, for deciding the inter-modal split between rail and road transport. In doing so, a futuristic view has also to be taken considering the role of the Railways as bulk carriers.

#### Sensitivity analysis.

NTPC had subjected these results to a sensitivity ana-

lysis to examine the effect on break-even points on increase in diesel prices which were raised by 50 per cent and 100 per cent respectively over 1976-77 level. This indicated a downward shift in the break-even points as calculated in kilometres ranging from 18 to 40 per cent under the first assumption, viz. a 50 per cent increase in HSD price and 30 to 60 per cent under the second assumption, viz. 100 per cent increase in HSD price over 1976-77.

NTPC realised that the increase in prices had already crossed the 100 per cent mark, and taking not of this fact by observed that if sensitivity analysis were carried out raising oil prices further, the break-even point were likely to be 'pronounced against road transport'.

The above discussion is a pointer of the role of the Railways vis-a-vis road which is the other mainstay of transport in the country. The other modes of transport, viz. airways and inland & coastal shipping, which in comparison are playing an insignificant part, were not gone into.

Any discussion about the inter-modal split amongst various transport modes would be incomplete unless the energy intensities of these modes are also compared.

This aspect was entrusted by NTPC to the National Institute of Training and Industrial Engineering, Bombay (NITIE).

The study computed the energy intensities\* for freight transport both in relation to fuel and energy efficiency. The findings of the NITIE study were that for freight, the Railways with electric traction is the most efficient form of transport in terms of energy consumption followed in that order by diesel traction on the Railways, pipeline, inland water transport, diesel truck and the Railway steam traction.

#### ANNEXURE A.5.2

(Cf. para 17.3.)

#### (All Railways)

#### Efficiency Indices

		1950-51	1955-56	1960-61	1965-66	1970-71	1971-72	1972-73	1973-74
GTKM moved per Kg. of tractive effort.	BG	1,525	1,688	1,864	1,962	2,147	2,215	2,254	2,092
	MG	1,191	1,245	1,444	1,621	1,714	1,750	1,789	1,520
NTKM per train engine hour	BG	8,590	8,570	10,808	12,202	13,492	13,926	13,938	13,966
	MG	2,884	3,437	4,232	5,047	5,824	6,097	6,337	6,616
NTKM per tonne of wagon capacity	PG	11,833	14,790	16,558	15,567	15,1170	15,626	15,717	13,950
	MG	9,021	8,497	10,125	12,255	12,583	13,003	13,225	11,574
Wagon Km. per wagon day (in terms of 4-wheelers).	PG	62.3	74.5	76.9	73.2	73.4	74.1	74.4	67.2
	MG	50.3	45.9	51.6	60.1	58.4	58.8	60.0	50.8
NTKM per wagon day (in terms of 4-wheelers).	PG	710	885	998	940	908	935	951	817
	MG	304	332	405	510	524	540	552	482
Average train load (tonnes)—									
Net load	{ PG	489	537	656	725	737	748	763	745
	{ MG	185	246	298	347	378	391	403	408
Gross load	{ PG	1,068	1,146	1,354	1,470	1,507	1,518	1,539	1,528
	{ MG	435	537	648	716	753	768	783	785

\* A definition of the term 'energy intensity' is necessary. This measures the amount of energy needed to move one tonne over

one km. by a given vehicle. When these measures are averaged for an entire system, they are described as energy intensity.



		1974-75	1975-76	1976-77	1977-78	1978-79	1979-80	1980-81
GTKM moved per Kg. of tractive effort.	BG	1,988	2,319	2,420	2,472	2,330	2,305	2,372
	MG	1,498	1,742	1,841	1,825	1,759	1,713	1,727
NTKM per train engine hour	BG	14,599	15,018	16,292	16,447	16,541	17,171	17,677
	MG	6,699	6,423	6,556	6,611	6,915	7,115	7,562
NTKM per tonne of wagon capacity	BG	15,186	16,412	16,754	17,259	16,047	16,025	16,285
	MG	1,876	12,313	12,843	12,764	12,310	12,139	11,013
Wagon Km. per wagon day (in terms of 4-wheelers).	BG	70.3	76.8	81.1	81.9	75.9	73.3	73.4
	MG	53.7	56.4	58.1	57.5	52.7	49.7	47.3
NTKM per wagon day (in terms of 4 wheelers).	BG	907	982	1,015	1,045	976	972	986
	MG	528	545	570	570	543	534	522
Average train load (tonnes)—								
Net load	BG	778	782	796	818	826	863	884
	MG	422	413	413	423	451	476	487
Gross load	BG	1,563	1,577	1,607	1,638	1,648	1,694	1,721
	M	800	800	785	800	835	849	871

## ANNEXURE A.5.3

(Cf. para 17.3)

## Efficiency Indices

(All Railways)

	Turn round		Engine Kms. per goods engine day				Speed of through goods			
	BG	MG	BG	MG	BG	MG	BG	MG	BG	MG
			Diesel	Electric	Diesel	Electric	Diesel	Electric	Diesel	Electric
1951-52	10.6	6.8	..	185	..	144	..	22.4	..	29.9
1955-56	10.5	5.1	..	207	..	163	..	21.4	..	29.7
1960-61	11.2	7.3	300	156	273	171	22.5	20.1	21.9	21.9
1965-66	11.8	8.4	353	327	283	143	24.0	23.7	17.7	18.3
1966-67	12.3	9.0	357	330	276	181	24.1	25.3	17.9	16.6
1967-68	12.7	9.6	361	341	282	197	23.5	24.8	18.3	19.9
1968-69	12.6	9.4	361	349	281	233	23.3	25.8	18.5	18.1
1973-74	15.0	12.5	307	272	259	248	22.4	22.6	19.3	21.3
1974-75	14.6	12.0	306	296	242	232	22.3	22.5	19.0	22.5
1975-76	13.5	11.6	321	331	286	225	22.3	23.7	18.8	20.0
1976-77	13.0	11.1	379	435	344	242	23.3	25.4	19.2	19.4
1977-78	13.3	11.5	353	406	308	211	22.5	24.9	19.0	18.6
1978-79	14.3	12.8	317	309	285	211	21.9	24.0	16.8	17.1
1979-80	15.1	14.1	307	289	277	207	21.4	23.6	18.5	18.0
1980-81	15.2	15.3	303	274	276	206	21.5	23.7	18.6	16.8



## CHAPTER VI

### INTERNATIONAL FREIGHT, CONTAINERISATION AND PORT TRUST RAILWAYS

#### 1.0. Optimisation of rail-cum-sea movement.

1.1. The initial development of the Railways was a result of the development of the ports, to facilitate the opening of the hinterland, to exploit its mineral resources, to use it as a market for finished goods, and quickly deploy the troops. The country has a long coast line and the coastal trading routes were well developed at the time of Independence. The rail network and coastal shipping should have been developed in coordination with each other. This, however, did not happen. Partially, the Railways themselves stifled the growth by attempting to take over a good portion of coastal movement for themselves. In the Sixties, they undertook to carry coal from Bengal-Bihar fields to far-off Saurashtra by all-rail system by reducing the freight. Subsequently, the Railways failed in their commitment, but meanwhile the damage had been done. The rail-cum-sea development, therefore, has to be viewed from a wider angle of the development of coastal shipping after drawing necessary lessons from the mistakes of the past and the overall apportionment of national transportation to different modes to best suit the needs of the economy.

1.1.1. Energy efficiency of coastal shipping is better than diesel but less than electric traction on the Railways. However, the US experience indicates that the energy efficiency of inland waterways ranks only second to the pipeline.

1.1.2. The Rail-Sea Coordination Committee submitted its Report in 1957. It recommended the development of coastal tonnage by diverting coal traffic from rail to sea. The anticipations of this Committee in regard to expansion of coal traffic were, however, not fulfilled. One reason was the Railways reluctance to take any additional quantity of coal by the sea route meant for Southern Railway, because it would have imposed a financial burden on account of higher freight rates.

1.1.3. CPTC\* has given data of rail and sea costs based on the then computation by a World Bank Coal Transport Study Team. The costs were computed from Calcutta for movement of coal by 10,000 DWT ships and this indicated that while rail movement to Madras and Cochin was cheaper by rail, the movement to Tuticorin, Goa and Kandla was cheaper by rail-cum-sea-route. If the haulage was arranged in 15,000 DWT colliers, the rail-cum-sea costs were invariably lower, except for Cochin and Bombay. CTPC also indicated the comparative position of rail freight and rail-cum-sea freight for the movement of salt, the latter being higher than the former.

1.1.4 NTPC also went into the question. It got the costs updated by RITES.\*\* The Report states that the

cost profile of coastal shipping is higher than highways and Railways in the shorter runs. It is only in longer distances that the advantage shifts in favour of coastal shipping with the economics of scale setting in. This pattern is influenced by high fixed costs and low variable costs of coastal shipping. The break-even distances calculated by the Report were 1,157 kms. in the case of highways and 1,761 kms. for the Railways. Table 6.1 indicates the comparison of the resource cost for certain specified situations.

Table 6.1

**Resource Cost Comparison-Railways, highways and coastal shipping-Coal (1976-77)†**

S. No.	Type of movement/ transport situation	Resource cost (Rs. per tonne)		
		Distance in kms. shown in brackets		
		Railways	Highways	Rail-cum-coastal shipping
1.	Coal siding to railhead			
1.1.	Andal-Madurai	216.6 (2,419)	222.5 (2,419)	215.0 (2,864)
1.2.	Andal-Shoranur	177.6 (2,321)	226.5 (2,215)	206.5 (3,037)
1.3.	Andal-Surendranagar	185.4 (2,059)	195.3 (1,894)	240.7 (4,826)
2.	Coal siding to Discharge port.			
2.1.	Andal-Tuticorin	244.3 (2,579)	240.1 (2,355)	188.7 (2,704)
2.2.	Andal-Cochin	187.1 (2,442)	237.8 (2,321)	186.9 (2,922)
2.3.	Andal-Navalakh	209.1 (2,209)	211.2 (2,058)	212.3 (4,766)

1.1.5. It would be seen from the above that in the case of Andal-Tuticorin, Andal-Madurai, and Andal-Cochin, the cost advantages is in favour of rail-cum-coastal shipping for coal. The fact is illustrative of the role of coastal shipping as it is the cheapest mode for certain situations.

1.1.6. Similar studies have been made for salt and the break-even points determined are 1520kms. between coastal shipping and highways and 2850 kms. between coastal shipping and the Railways. Table 6.2 indicates the

\* Page 45 of the Report of NTPC, 1980.

\*\* Committee on Transport Policy and Co-ordination—P. 19.

† Report III of RITES' Report on Resource Cost Studies—

Coastal Shipping—Freight (Transport Policy Planning Project, Planning Commission, Govt. of India).

\* Source : Report III of RITES' Report on Resource Cost Studies.



**Summarised position**

Table 6.2

**Unit resource cost-highways, Railways and coastal shipping-salt (1976-77)\***

(Rs. per tonne)

No.	Transport situation	Resource cost		
		Distance in Kms. shown in bracket		
		Railways	Highways	Coastal shipping
1.	Tuticorin-Calcutta	221.5 (2,460)	256.8 (2,345)	186.3 (2,390)
2.	Bhavnagar-Calcutta	212.4 (2,320)	241.0 (2,187)	207.3 (3,884)

1.1.7. These costs were subjected to sensitivity analysis on various assumptions. The assumption in the case of coal and salt related to increased capacity utilisation of ships and decreased port detentions. The resource costs tilted in favour of rail-cum-coastal shipping under all these assumptions for coal, and the same held good for salt also. The best results were obtained under the assumption when the utilisation of vessels was increased from the present 64 percent to 85 percent and the port detentions were substantially reduced.

1.2. The growth of coastal traffic in the Fifties and early Sixties, as would be seen from Table 6.3, received a fillip, primarily by increased coal traffic, which was loaded ex. Calcutta for ports in Southern and Western India.

Table 6.3

**Coastal traffic in India-dry cargo**

(Lakh tonnes)

Year	Coal	Salt	General cargo	Total
1951	7.70	4.54	12.90	25.14
1952	10.89	4.71	12.19	27.79
1953	12.63	4.18	11.97	28.78
1954	12.28	4.79	11.98	29.05
1955	10.64	4.71	11.69	27.04
1956	10.97	4.78	10.17	25.92
1957	10.51	4.80	10.46	25.77
1958	10.86	3.93	11.87	26.66
1959	10.16	3.99	11.42	25.57
1960	11.03	4.17	12.25	27.45
1961	13.73	4.73	15.03	33.49
1962	19.80	4.58	16.39	40.77
1963	18.95	4.76	16.58	40.29

1.3. While salt traffic remained more or less the same, there was some growth in 'general cargo'. The growth has influenced because of the Railways inability to carry all the traffic in the Fifties and early Sixties but in the Third Five Year Plan, the Railways were able to develop and sustain increased transport capacity. This improvement permitted them to resile from their earlier commit-

ment of carrying coal by the coastal route. This resulted in starvation of coastal shipping and to its consequent decay. The decline can be gauged from Table 6.4.

Table 6.4

**Coastal shipping traffic 1962-1980.**

(in lakh tonnes)

Year	Coal	Salt	General	Total
1962	19.8	4.8	16.4	41.0
1971	5.1	5.2	6.1	16.4
1980	7.7	2.4	1.7	11.8

1.4. Coastal shipping can, theoretically, be considered as an economic mode under certain circumstances for coal and salt. Having regard to the long coastal line and the desirability to develop coastal shipping to provide a desirable relief to the Railways, the Committee recommend development of coastal shipping to enable it to carry bulk commodities, wherever it is more economical to do so. The Committee also recommend selective movement of coal by the coastal route. In doing so, the capital intensive investments on the Railways would get reduced, which may, otherwise, become necessary on freight intensive routes.

1.5. If steps are taken to revive and strengthen coastal shipping, coastal traffic is likely to grow substantially. The Committee had set up a Group on Operational Optimisation & Planning, and this Group has forecast a likely growth of 12.1 million tonnes of coastal traffic in 1989-90. NTPC Report, however, suggests a figure of 12 million tonnes by the end of the century. Coal, cement, fertilizers and salt would continue to be the most important commodities and, therefore, the Government would be well advised to adopt a conscious policy of earmarking definite quantities of cargo with specific directions to public sector undertakings to fully utilise coastal shipping for such movements. This may require marginal adjustments in the freight structure on Shipping and the Railways, which would have to be studied separately. The growth of this shipping would also enable the cost-based industries. Such as fertilizers, cement, chemicals, to move their products in coastal ships.

1.6. Transport interface with the ports not only involves international cargo, but also inland cargo and, therefore, the problem has to be viewed in two distinct aspects.

**2.0. Inland transport.**

2.1. The Railways development has been directed towards consolidating and integrating the various parts of the country by providing cheap and efficient transport of goods between the producing and consuming areas. The pattern of exports and imports has also, changed. While in the Fifties, the exports were confined to cotton textiles, jute goods and tea (about 58 per cent), now a wide variety of engineering goods, ready-made garments, leather and leather manufactures and chemicals figure as important items. Similarly, in imports, while in Fifties, cotton, machinery and foodgrains were the major imports (45 per cent), now crude, petroleum products, fertilizers and edible oils constitute the major items.



2.2. The overseas trade has substantially increased, as would be seen from the handling of cargo at the four major ports in the country, indicated in Table 6.5.

Table 6.5

## Total cargo handled at four-major ports

Port	1950-51 (In million tonnes)	1980-81 (In million tonnes)	Percentage increase
Calcutta	7.60	9.69	29.2
Bombay	7.00	17.57	151.0
Madras	2.20	10.38	371.0
Cochin	1.40	5.23	273.6
Total for these ports.	18.20	42.87	135.5

2.3. The composition of export and import cargo in terms of dry bulk, liquid and general goods, which were handled at these ports in 1980-81, is indicated in Table 6.6 :

Table 6.6

## Composition of import and export cargo

	Import in lakh tonnes	Export in lakh tonnes
<b>Bombay—</b>		
Dry bulk cargo	17 (13%)	3 (8%)
Liquid	81 (61%)	2 (5%)
General	35 (26%)	38 (87%)
Total	133 (100%)	43 (100%)
<b>Calcutta/Haldia—</b>		
Dry bulk cargo	10 (40%)/2(3%)	2 (17%)/7(66%)
Liquid	8 (31%)/42.4(94%)	(2%)/3(29%)
General	7 (29%)/1(3%)	1 (81%)/—(5%)
Total	25 (100%)/45 (100%)	13/10 (100%) (100%)
<b>Madras—</b>		
Dry bulk cargo	7 (10%)	32 (79%)
Liquid	38 (60%)	5 (13%)
General	19 (30%)	2 (8%)
Total	64 (100%)	39 (100%)
<b>Cochin—</b>		
Dry bulk cargo	7 (17%)	8 (73%)
Liquid	31 (76%)	3 (27%)
General	3 (7%)	—
Total	41 (100%)	11 (100%)

2.4. The above information indicates the following :

1. Of the total tonnage handled, 51% was liquid cargo.
2. Of the dry bulk cargo about 45% was handled at Madras alone.
3. Of the 'general goods' the heaviest concentration was at Bombay.

2.5. Import/export cargo originates and terminates not only in the port hinterland, but also in the far-flung areas. The Railways, therefore, play a crucial role in the transportation of the cargo between the port and production/consumption centres. While data for the distribution of cargo for all the ports between the immediate hinterland and the far-flung areas is not available, a study made of the inward traffic in Bombay port has shown that

about 36 per cent of cargo belong to hinterland of the port and 64 per cent of the cargo originates in far-flung areas extending upto West Bengal, Assam and Tamil Nadu for Bombay Port. These figures are given in Table 6.7.

2.6. Assuming that more or less a similar pattern, would be applicable also in the case of other major ports, the role of the Railways in providing the requisite transport becomes crucial. The Railways have not only to match the availability of ships, both for imports and for exports, but also have to give a fillip to the movement of export cargo.

2.7. In the past, industries were concentrated near or around the major ports within a perimeter of 300 miles from the coast. This naturally restricted the role of the Railways or the possibility of rail-cum-road movement. With the rapid growth of industry, and its diversification all over the country, the demand for connected transportation by rail has increased significantly. Fast, safe and economical overland transport for our export cargoes to ports is essential to keep our trade commitments to overseas buyers and to maintain the competitiveness and mobile transport in the reverse direction for benefits to the national economy.

Table 6.7

## Inward Traffic in Bombay-1980

Distance (in Kms.)	Percentage of total cargo
<b>Upto 1000 kms.</b>	
634 Maharashtra	26.2
977 Gujarat	10.5
<b>1000-1500 kms.</b>	
1,015 Andhra Pradesh	3.5
1,055 Karnataka	1.7
1,134 Rajasthan	6.1
1,217 Madhya Pradesh	5.5
1,279 Tamil Nadu	0.6
1,466 Uttar Pradesh	7.1
<b>1500-2000 kms.</b>	
1,530 Delhi	1.5
1,598 Haryana	3.7
1,658 Punjab	23.1
1,842 Kerala	0.1
1,870 Bihar	4.1
1,974 Jammu & Kashmir	...
<b>2000-2500 kms.</b>	
2,054 West Bengal	4.8
2,262 Bihar	0.3
<b>Over 3000 kms.</b>	
3,246 Assam	1.2
	100.0

## Outward traffic from Bombay-1980

Distance (in Kms.)	Percentage of total cargo
<b>Upto 1000 kms.</b>	
786 Goa	0.2
789 Gujarat	13.2
915 Maharashtra	23.9
<b>Upto 1500 kms.</b>	
1,221 Rajasthan	1.7
1,221 Karnataka	0.2
1,280 Tamil Nadu	1.3
1,403 Delhi	1.7
1,478 Madhya Pradesh	11.1
<b>1500-2000 Kms.</b>	
1,505 Andhra Pradesh	1.8
1,595 Haryana	2.1
1,630 Chandigarh	0
1,689 Uttar Pradesh	15.5
1,694 Himachal Pradesh	0
1,790 Orissa	0.2
1,842 Kerala	0.1
1,893 Punjab	22.0
1,992 Jammu & Kashmir	1.1
<b>Above 2000 kms.</b>	
2,101 West Bengal	1.2
2,068 Bihar	2.4
<b>Above 3000 kms.</b>	
3,135 Assam	0.3
	100.0



2.8. As a short-term measure, and to ease the existing transport bottlenecks, the possibility should be explored of carrying foodgrains (wheat and rice) from Kandla to down South by ships even if it requires marginal freight-subsidisation. This is a major stream of North-South rail-borne freight moved at present. Firstly, this will eliminate the pressure on the Railways saturated north-south route. Secondly, it will enable the Railways to divert a traffic stream to Kandla, which is under-utilised. The foodgrains can be loaded in ships from Kandla and taken for instance to Cochin and Tamil Nadu (especially wheat and coarse grains). Thirdly, it will also enable the Railways to increase the generation of empties in Kandla area for back-loading of fertilizers for which the Railways have to carry empties today from long distances. In the short run, this is likely to yield substantial benefits. Even in the long run, with increased irrigation facilities in the Narmada region and Gujarat also developing as a granary, the export of foodgrains from Gujarat via Kandla port should become a permanent feature. This would require development of silos for storage of foodgrains at Kandla and mechanical loading of ships and similarly, storage facilities alongwith mechanical unloading facilities at the unloading ports.\*

### 3.0. Containerisation.

3.1. In Chapter V, a recommendation has been made for encouraging containerised transport for mails and even wagon-load traffic. Containerised transport implies loading of merchandise on 'flats' on the Railways and thereafter moving on by road or by sea, as necessary. International multi-modal transport provides the best technique for optimising rail-cum-road-cum sea movement. It seeks to provide a total transportation oriented to the needs of the customer. It replaces the conventional fragmented transport system, and transcends physical and economic barriers with quicker combined movement, enhancing the productivity of ports, and encouraging development of an efficient cost-effective transport network. Imports and export of non-bulk cargo can be handled in containerised form.

3.2. A marked transition to containerised movement has already taken place all over the world, and India has also to fall in line. This will require establishment of inland container depots. The Railways will have to gear themselves up for moving train loads of containers in 'flats'. The container depots will have to be provided with adequate space for container yards, facilities for mechanical handling, stuffing/de-stuffing of cargo and undertaking door-to-door delivery by road.

3.3. The advantage of containerisation can be summed up as follows :

1. It is an integrated system of transport which provides for rail-cum-road-cum-sea flexibility on the basis of a single contract and a through freight rate.
2. It reduces the chances of pilferage.
3. It facilitates door-to-door deliveries.
4. It is susceptible to quicker handling by mechanical means.

3.4. Containerisation will require facilities at the ports and facilities over the Railways, as also facilities on the Road at the terminals. As far as the ports are

concerned, the Committee do not feel it necessary to comment, except to mention that the Government has already decided to develop Nava-Sheva port as a container port and container berths are being created in the other major ports of the country.

3.5. As far as the Railways are concerned, their attempts to quicken the transition have not been satisfactory. The report of the Working Group for the Railways for the Sixth Five Year Plan indicates that while a Working Group on Containerisation was set up by the Government in 1969, another group set up in 1975, and yet another group in 1978, it is understood that no real progress has been made in this sphere. The Railways made a tentative beginning by introducing domestic container service in early 1966. An incidental, but important objective was to attract high-rated road-borne traffic for rail movement. This was a leaf from both European and American experience. A mini container, a small container and a medium container were introduced.

3.6. Under the peculiar economic and trade conditions in the country, mini and small containers did not flourish. Small scale industries that these containers could serve were fickle in their patronage. They haggled about the rates and wanted them frequently changed to which the Railways could not agree.

3.7. The Railways, to begin with concentrated on the medium container and though they started with 4.5 tonne containers between Bombay-Ahmedabad and Delhi-Bombay, they have since standardised on a five-tonne container.

3.8. The Railways with advantage could have gone in for 10,20 to 40 tonne ISO containers. If this had been done, the world-wide container revolution would have swept over India a decade earlier.

3.9. On account of the conditions of bridges and roads only the Railways have the capability of transporting the ISO container over any appreciable distance. Improvements on the roads will be necessary.

3.10. Container services have by now, linked Delhi with Bombay, Bombay with Ahmedabad, Bangalore with Madras and services on a few more trunk routes have been prospected. Some containers are also moving on off-beat routes. What, however, has happened is that as more new traffic has not been prospected, neither has international ISO-container traffic been brought in the circuit, the meagre fleet is being floated around for odd fortuitous traffic.

3.11. On the present routes, the containers are moved on the rail portion by rail four to a flat, and on the road portion at the terminal towns on the Railways' own road vehicles.

3.12. The Railways have planned to set up inland container depots at Tughlakabad, Bangalore and Ahmedabad. Last year, as a stop gap arrangement, the small exhibition siding of the Railways in the Exhibition Ground at New Delhi was planned to be used for handling containers till the time the Tughlakabad complex was developed, but that has also not fructified. The Working Group for the Sixth Plan for the Railways had asked for a plan provision of Rs. 40 crores in the Sixth Plan for the development of these depots, but only Rs. 10 lakhs were provided till 1982-83. If inland container depots have to be made to give proper services and profits, half-hearted measures as taken up till now, should be avoided.

\* In fact, the Committee understand that there is inadequate usage for the godown mechanical loader already installed at

Kandla Port and this should also be able to handle bags of foodgrains.



3.13. The Railways have also spelt out\* a conceptual plan for the subsequent development of additional inland container depots at the following sites :

1. Hyderabad
2. Kanpur
3. Coimbatore
4. New Jalpaiguri
5. Ranchi

The Committee consider that if the scheme adumbrated is accepted, container depots would have to be established, in addition, at Bombay, Calcutta and Visakhapatnam. These locations are only in the conceptual stage and a final view should be taken after detailed examination of all the factors by the Railways themselves.

3.14. Flat wagons designed for carriage of ISO containers have to be procured. The present flats are suitable for containers which are smaller in size than the ISO containers. The container revolution makes it mandatory for the country to opt for ISO standard. The dimensions of ISO containers and the containers presently being used in the country are given below :

ISO Container : 20' x 8' x 8½'

Domestic Container : 7' x 11' x 5'11" x 6' x 8½"

The existing flats require minor modification if they have to be used for transportation of ISO containers. Action on this needs to be taken as a part of a coordinated plan for fast containerisation.

3.15. Another requirement is provision for mobile lifting cranes and Goliath cranes for the inland container depots.

#### 4.0. International Cargo.

4.1. The containerised facilities are likely, to be capital intensive in nature and, therefore, economic prudence would require these being limited to a few important ports. There is also a possibility of the Railways being asked to run charter trains by the Shipping Corporation of India on the 'land-bridge' concept. We had set up a Working Group on Operational Optimisation & Planning and this Group has reported as a result of its discussions with the Shipping Corporation of India the possibility of aggregating cargo in containers at one or two selected ports on the East or West Coast and then transporting them by rail to one or two selected ports on the other coast through fast block trains thereby avoiding the longer sea haul round the coast. Initially, it may be advisable to select one port on the east coast and one on the West coast.

4.2. The concept of land bridge has already been successfully tried out in Europe, America and Soviet Union. To quote some examples : the Trans Siberian Railway arranges the transport of containers from points within Continental Europe to the Soviet Border stations, which are taken all the way to the ports on the Pacific coast for shipment to Japan, South Korea, Hong Kong, Malaysia and even Philippines. In the reverse direction also, cargo is carried from several Japanese ports to Nakhodka by ships from where containers are carried by rail to the border stations by unit trains. A Soviet Union train consists of 50 cars, each car carrying two containers of 20 feet or one container of 40 ft., and runs at an average speed of 65 kmph. At the border stations,

transference is arranged either to the Continental rail systems or the traffic is carried by USSR Shipping Companies to other ports.

4.3. In the USA, the Railways provide a land bridge for containers between Far East and Europe obviating the circuitous passage through the Panama Canal. In addition, containers unloaded at the ports on Atlantic Coast are carried to the ports on Pacific Coast and *vice versa*. Rail heads with ample parking areas, with container handling equipment and railway siding with entry and despatch of containers being monitored by computers, have been developed extensively. The system has proved to be efficient, economical and profitable to the Railways. Similar systems have been developed in Canada and Australia.

4.4. The Railways can thus act as a land bridge in respect of the following traffic :

1. International containers moving from countries in the west to the countries in the east with the Indian Railways providing a land bridge. We can visualise such movement between Bombay and Calcutta or Haldia, between Madras and Cochin or even Kandla and Calcutta etc.

2. To avoid cost-intensive containers carrying ships moving on the Indian sea board extending over 5000 kms. containers can be channelised at a few ports, thereby saving time and cost.

4.4.1. We feel that the Railways should equip themselves for the above task, which in the years to come, may result in substantial growth.

4.5. The Committee after careful consideration conclude that in order to give a fillip to containerisation in the country, a Container Corporation on the Railways should be immediately set up. This Corporation will not only sponsor, plan and execute various inland and international containerisation projects, but would also arrange to programme and progress to 'land bridging' of international maritime traffic.

#### 5.0. Port Trust Railways.

5.1. The Port Trust Railways were developed during the British days to cope with imports and exports. As the pattern of operation was on wagon loads, the port railways also developed facilities for placement of wagons in a large number of sidings. Port Trust systems with extensive sorting, re-sorting and placement facilities permitted a personalised service. While the pattern of import and export and the railway transportation system are changing, the Port Trust Railways have generally remained immune to such modernisation.

5.2. A typical example is provided by the Bombay Port Trust which has been incurring heavy losses, as would be seen from table 5.8 :

Table 5.8

Year	Revenue Rs.	Expenditure Rs.	Deficit (—)
1976-77	197 lacs	302 lacs	(—)105 lacs
1977-78	181 lacs	354 lacs	(—)173 lacs
1978-79	167 lacs	370 lacs	(—)203 lacs
1979-80	184 lacs	437 lacs	(—)253 lacs

\* Report of the Working Group on Railways for the Sixth Five Year Plan (page 86).



5.3. While initially, the Port Railway made the port prosper, with the passage of time, it became a losing unit. The Bombay Port Trust Railway System is occupying 250 acres of land space on the Port Estate and has now a large number of sidings, which have fallen into dis-use, and vast storage sheds have been leased out to outside parties as storage godowns but which do not handle any traffic at all. The handling of traffic on the system has gone down, as would be seen from Table 6.9 :

Table 6.9

Year	Wagons handled
1917-18	2,77,971
1943-44	3,93,802
1977-78	1,75,690

5.4. A study of the traffic being handled at Bombay Port indicates that out of an approximate handling of three million tonnes per annum, only 2.25 million tonnes is connected with export or import, .6 million tonnes is POL and .75 million tonnes is 'local traffic' comprising timber, charcoal, pulses, which meets the demands of Bombay city.

5.5. The handling of such 'local traffic' (i.e., traffic being taken by rail for meeting the needs of Bombay and being handled in the Bombay Port Trust) in sizeable quantities appears to be impeding the progress of modernisation. Arising out of purely historical reasons, the handling of this traffic has by now got perpetuated, and a transference to other areas appears difficult due to want of space, which is neither being used nor is capable of being put to alternative uses and the obsolescence of the Port systems, which have become a drag on their finances, radical solutions are called for.

5.6. One view is that such systems, which have outlived their utility, can be dismantled, thereby releasing the land space for alternative use and preventing financial losses to the ports. It can also be argued for a port like Bombay that the released space could be used for handling additional containers, etc. The situation in other Port Railways does not appear to be very different.

5.7. The question of making more efficient usage of the Port Trust Systems has to be looked at on a long-term basis for re-orienting their working in conformity with the future pattern of operations. For example, the Port Trust Systems will have to be equipped for handling block rakes of cargo of import, export of and containers, with transference of cargo from rail to ship being arranged alongside the berth. As the future movement on the main line rail system will be very largely in block rakes. The Port Trust Systems will not work, if they do not fall in line with this pattern.

5.8. The extinction of the port railway system does not appear to be a correct approach, but dismantling of largely unused facilities is certainly called for. A detailed study of each port trust system should be made to decide how best the existing facilities can be used to suit the changed pattern of operation by necessary investments and development of facilities for direct loading from block rakes to the ship and *vice versa*.

5.9. The decline of Port Trust Railways is attributable partly to their functioning as independent systems outside the control of the main land railway system. The working of the Port Railways *vis-a-vis* the trunk

railways has attracted considerable notice and many Committees have gone into this aspect. As early as 1968, the Ministry of Transport & Shipping had appointed a Study Team for the major ports of India and this Committee had suggested that the Port Trust Railways were not being managed properly unlike the main land railway systems at that time. That Committee, therefore, concluded that a time had come when the Port Railways should cease to have an independent status and be taken over the national railways.

5.10. Over by the years, arising out of this controversy, it has been argued that considerable duplication and delay in cargo handling can be eliminated if the Port Railways would merge with the Indian Railways. Firstly, these Railways become like 'exchange yards', where an artificial break is imposed on a continuing stream of traffic. Secondly, the major function of a Port Trust system is to look after the loading/unloading of ships as its primary objective and not to run a railway system, for which better expertise is available with the main-land railway system. Such working exists in the United Kingdom, the Federal Republic of Germany and some other countries where the national railway handle all containerised and break-bulk cargoes right from the pier, which are provided with extensive equipment and carry cargo up to the ultimate destination.

5.11. There is little doubt about the overall advantages of this system, which would not only make the economies of scale available to the Port Railways but also expose them to the organisational and technological network advantages of a vast railway system. This, therefore, we think, is ultimately the correct solution in regard to the Port Railways of the major ports, *viz.*, Bombay, Calcutta, Madras, Visakhapatnam, Kandla and Haldia. The rail complexes in the minor ports should continue to be with the Port Authorities, as there are no special organisational or operational problems in regard to them.

5.12. Having said this, the Committee may emphasise that there are problems relating to labour, wages etc. that such an arrangement of merger will inevitably surface. For instance, it was pointed out by the Chairman, Bombay Port Trust, during a discussion of the Committee with him and his officers at Bombay on 11 February, 1982 that while he agreed that the Bombay Port Trust Railway should be integrated with the mainland Railways in view of the overall advantages to operation, it needed to be reckoned that the Bombay Port Trust Railway was incurring a loss of Rs. 3 to 4 crores per year, while measures for economies and rationalisation planned by the Port Trust could not be executed due to resistance from certain quarters. He also mentioned that the problems of relatively higher wages and prerequisites of personnel would also be relevant.

5.13. The Committee recognise that some problems will arise and would need to be settled if their recommendation for the eventual merger of Port Trust Railways to the mainland system is implemented. At the same time, we believe that in the overall interest of the national transportation arrangements, both in respect of rail-borne and sea-borne traffic, such a merger is desirable and necessary. After all when the State Railways, like Nizam State Railway, Mysore State Railway, Jodhpur State Railway, Bikaner State Railway, were merged with the mainland railway systems, such problems were encountered and successfully resolved. There is, therefore, no doubt that the problems relating to the personnel and wages of Port Railways can also be satisfactorily solved.



5.14. The Committee, however, feel that the logistics need to be carefully evolved and considered by a joint Inter-Ministerial Task Force comprising representatives from the Ministries of Railways and Shipping & Transport, and the Planning Commission. We also recommend that Chairmen of a few of the major Port Trusts and the General Managers of the concerned Railways should be co-opted on this Task Force. This Task Force will devise the methodology of executing the merger, and how the different resultant problems can be settled.

5.15. The Committee also realise that this will take some time and, therefore, they would make a specific recommendation towards the rationalisation of activities of the Port Railways. Thus, we recommend that, during the interregnum, the interchange between the Port Railways and the main-land Railways should be abolished. Under this arrangement, the mainland trains should run through over the port system to and from the points of loading/unloading. This would require a different kind of administrative arrangement than what exists today. The maintenance facilities for the rolling stock should be provided by the mainland Railways both in the interest of economy expertise and effectiveness.

5.16. The Port Trust Railways should be managed, even during the interim period, by inducting suitable officers of proven merit from the mainland Railways taken on deputation on specified tenures.

5.17. The present chapter, along with the recommendations therein on coastal shipping, containerisation, land-bridging of maritime traffic and the Port Trust Railways, were referred to the Ministry of Shipping & Transport of the Central Government for their comments. The Committee have since been advised by Secretary, Transport, vide his letter No. 6141-Secy./82, of 26 September 1982 that "the basic thinking reflected in the draft chapter is generally in line with our approach on the subject". The Railways should, therefore, seriously take up the implementation of the recommendations in consultation with the Ministry of Shipping & Transport.

## 6.0. Conclusions.

6.1. In view of India's extensive coastal sea-board and the Railways' enormous commitments, coastal shipping should be developed as an economic mode of transport for certain specific streams of bulk commodities. In this context, selective movement of coal and salt is recommended.

6.2. The development of the Railways should also provide for adequate impetus for the movement of export and import cargo, sometimes jointly with coastal shipping. As a short-term strategy, movement of foodgrains from Kandla by ships to Southern India be explored, even if some freight-subsidisation becomes necessary.

6.3. The Railways should adopt ISO containers for movement of international freight. Simultaneously, they should usher in a container revolution by undertaking movement of containerised freight after developing necessary facilities including establishment of inland container depots.

6.4. The possibility of the Railways acting as a land bridge to international container movement requires to be seriously explored, as in this lies not only a bonus of international traffic, but also an incentive to the development of Indian commerce and shipping.

6.5. A Container Corporation may be set up to sponsor, plan and execute inland and international containerisation projects.

6.6. The existing major Port Trust Railways should be merged with the mainland Railways in the interest of efficient movement of throughput. While the modalities for merger may be worked out urgently by a Task Force, to be set up for the purpose, the existing practice of interchange of traffic between the port and the maine and Railways should be given up without delay in favour of through movement.



## CHAPTER VII

### TRACTION POLICY

#### 1.0. Introduction.

1.1. For well over a hundred years the Railways all over the world depended on steam traction. Around the turn of the century, developments in the field of metallurgy had made the internal combustion engine a viable alternative. Simultaneously, the use of electric power as a tractive force also came to be recognised, but in the early years, its role remained limited to suburban light passenger services. It was in the inter-war years, in the thirties, that wide-spread replacement of steam by the diesel locomotive was initiated especially in the USA.

1.2. It became increasingly apparent that diesel and electric traction offered advantages that were difficult to match by steam traction. New vistas of load haulage, speeds, and motive power availability were being explored which increasingly highlighted that the steam locomotive had reached its design limits. With present-day knowledge, the steam engine is certainly capable of much higher efficiency and better overall performance, but the possible gains are not attractive enough to match the potential of the internal combustion engine and the electric traction.

#### 2.0. Traction development.

2.1. Annexure A-7.1 gives an idea of the development of traction on the Indian Railways since 1950, when there were 8,120 steam locomotives with just 17 diesels and 72 electrics. 98% of the haulage was done by steam locomotives. Electrification was introduced in a small way in 1927, and was largely limited to the suburban complex around Bombay. The 17 diesels imported in 1945, were BG shunting engines and there was no main line diesel haulage. Nine of these are still in use.

2.2. It became apparent in the early years of the First Plan that many of the BG sections of the Indian Railways would soon reach limits of carrying capacity with steam traction. As the First Plan was principally a plan for rehabilitation, large scale dieselisation and electrification could not come about on account of high capital investment required and the need for smooth technology transition.

2.3. A steam locomotive manufacturing facility was therefore, established in Chittaranjan, which went into production in 1950-51. This achieved a peak annual production of more than 170 locomotives between the years 1954-59 and 1963-64. Simultaneously, plans went ahead for increasing dieselisation and electrification. Chittaranjan produced its first DC electric locomotive in 1961-62 and took up production of diesel shunters in 1968. Steam locomotive production was finally closed in 1972-73 but meanwhile, CLW had manufactured 2,351 steam locomotives. This fleet enabled the Railways to tide over the major expansion of traffic during the first three Five Year Plans, but it now presents a major problem for phasing out. Simultaneously, main line diesel locomotives were manufactured at Diesel Locomotive Works, Varanasi, commencing from

1963-64 both for BG and MG. DLW also manufactured heavy duty diesel shunters, leaving the lower H.P. shunters and NG diesels for CLW. There is no manufacture of MG diesel shunting locomotives so far.

2.4. Steam had clearly outlived its role in the closing years of the Sixties, but the question then was the pace at which modern forms of traction could be introduced, the cut-off point beyond which steam locomotives were not to be given further inputs, and the time when an accelerated removal of steam locomotives from line could commence. The last of these issues is of vital importance and is still relevant today. The Committee have gone into three broad related problems as follows :

1. The pace of elimination of steam traction.
2. The future mix between diesel and electric traction.
3. The development of diesel and electric locomotives to suit the type of operation envisaged for the future.

#### 2.5. The major limitations of the steam locomotives are broadly the following :

1. The overall thermal efficiency of the locomotive is extremely low at about 6.7 percent. The imperatives of the energy crisis itself, therefore, demand that a more efficient mode of tractive energy be utilised. It is unlikely that even with a concerted R & D effort the efficiency can be raised much above 10 percent diesel and electric traction are amenable to overall efficiencies in excess of 20 percent.
2. The power to weight ratio on steam is extremely poor as compared to diesel and electric, and there is, therefore, an in-built deficiency in steam.
3. There is a limit to which tractive effort and horse power on the steam locomotive can be increased owing to limitations of size.
4. It is difficult to achieve high speeds on steam locomotives without excessive strain on the track structure, on account of the inherent imbalanced forces in the reciprocating motion of connecting rods, side rods etc.
5. Owing to the need of constant watering, coaling, boiler wash-outs etc. the availability of steam locomotives is extremely poor, compared to the diesel and electric. Experience has shown that on an average, the steam locomotive cannot be made available for useful work more than 13-14 hours per day, whereas diesel and electric locomotives are able to withstand more than 20 hours, without unduly straining the system.



6. The amount of fuel to be carried by the Railways to feed their own locomotives is disproportionately high in steam traction as compared to diesel. By way of example, in 1962-63, when steam was the mainstay of through goods traffic 16.1 million tonnes of coal had to be carried to generate about 78 billion NTKM, whereas in 1980-81, only 1.09 million tonnes of high speed diesel oil were necessary for 107 billion NTKM. In the case of electric traction, there is no internal movement necessary, and it is limited to a more efficient transport to power plants in the form of revenue earning traffic.

### 3.0. Transitional factors.

3.1. In overall financial terms, the reported cost\* of haulage in 1979-80 was Rs. 31.70 per 1,000 GTKM on steam through goods, Rs. 55.5 per 1,000 GTKM on general goods and Rs. 20.85 per 1,000 GTKM passenger services on the BG. The comparative diesel figures were Rs. 10.91, Rs. 10.8 and Rs. 12.99. There is a similar marked difference on the metre gauge. The figures of electric traction were generally comparable to diesel on goods service. Some part of this difference in costs can be accounted for by the fact that steam is operated on inferior goods services vis-a-vis diesel while electric is on the highest density most efficient routes. Nonetheless the difference in costs is substantial and highlights the financial burden of perpetuation of steam traction.

3.2. Figures of Delhi Division of Northern Railway show that in overall terms there are 12.8 maintenance staff per steam locomotive†. As against this, there are only 7.6 per diesel. As will be brought out later in paragraph 4, the 6,738 locomotives in service in March, 1982, can be replaced by approximately 3,005 diesels/electrics. Saving in maintenance staff along with, therefore be about 63,400. Similarly, there is one less crew member on the diesel and electric as compared to steam, irrespective of the type of service. In overall terms, the Northern Railway has taken 10.25 running staff (inclusive of cleaners) per steam locomotive, while the figure is 8 in the case of diesels. This will give a saving of about 45,000 running staff when steam traction is totally eliminated. The overall saving in manpower at about 108,500 would give a recurring annual saving of approximately 108.00 crores‡.

3.3. In para 3.1 the difference in overall costs of movement between various forms of traction has been mentioned. There is also a difference in the cost of shunting services, and, it is estimated on the basis of 1979-80 pricing (the latest figures available) that the overall recurring saving after the full replacement of steam services would be about Rs. 185 crores not taking into account shunting services. See Annexure A-7.2 pages 2.

3.4. There is a clear and urgent need, therefore, the phase out steam as fast as possible, both in the

interests of efficiency as well as to improve the financial position of the Railways.

### 4.0. Phasing out of steam.

4.1. On 31 March, 1982, there were 3,975 steam locomotives in the BG power plan, 2,423 on the MG and 340 on the NG, giving a total of 6,738 as against a physical holding of 6,880. This would indicate that 142 steam locomotives could be immediately retired without replacements, based on traffic levels and utilisation achieved in 1981-82. In the past, condemnation of overaged steam locomotives had gone heavily into arrears and at the end of the Third Five Year Plan, 28.5M of the BG and 17.2% of the MG fleet was overaged. Since then, there has been substantial improvement, especially from 1979-80 onwards, when 171 overaged steam locomotives were taken off from service as compared to 94 in the previous year. In 1980-81, the figure rose to 440, and, in 1981-82 to an estimated 589. This has largely brought the steam locomotive fleet within its 'codal life'\*\* although on the NG, about 220 locomotives, representing almost 64% of the fleet continue to be overaged. The question now arises whether this rate of condemnation of steam locomotives can and should be further accelerated, in line with operating requirements, instead of being pegged to 'codal life'. As per codal life, steam locomotives will continue to remain on the system upto 2013 AD, and even 10 years earlier in the year 2003 AD, almost 1,360 steam locomotives (820 on the BG and 540 on the MG) would continue to exercise an uneconomic drag on the system, tying heavy maintenance and workshop capacity, and special infrastructure such as coal handling, water columns, ash pits etc. The Committee have gone into this question in detail and recommend that the process should be accelerated in a determined and meaningful manner.††

4.2. The power plan service-wise deployment of steam locomotives on 31st March, 1982 was as indicated in Table 7.1.

Table 7.1

Steam power plan as on 31st March, 1982

Type of service	BG	MG	NG	Grand Total
Mail/Express, Passenger	1,489	1,255		
Goods	719	465		
Shunting	1,371	620		
Departmental	396	83		
Total	3,975	2,423	340	6,738

These locomotives cannot, obviously be replaced overnight.§

\* Source : Summary of the End Results, Freight Services Unit Costs 1979-80 published by the Directorate of Statistics and Economics (Cost Analysis Unit), Ministry of Railways, published in Jan. '82 and Cost Analysis of Coaching Services for the year 1979-80 published by the Ministry of Railways.

† This was done as a representative analysis.

‡ The average cost of running staff in 1980-81 was Rs. 10.445 other than running allowance and Rs. 9.653 for 'Group C' maintenance staff. There has been a substantial increase since then.

\* These figures are tentative since the actual rolling stock holdings for 1981-82 are not yet published.

\*\* 'Codal life' of the steam locomotive is taken as 30 years.

†† These conclusions are based on a special study undertaken by the Committee. See para 3.2 also.

@ Annexure A-7.3 2 gives the norms adopted in equating the various types service-wise.



4.3. As against the requirements brought out in greater detail in Paragraph 4.8, the total production capacity of diesels and electric locomotives at Diesel Locomotives Factory, Varanasi and Chittaranjan Locomotive Works is, as follows :

**C.L.W.—**

Electric locomotives ... 66\*  
Diesel shunters/NG ... 45 + 5 power packs

**D.L.W.**

Diesel Main Line ... 130 + 20 power packs  
(BG & MG).

The production given above will have to cater both to incremental and replacement requirement.

4.4. A number of important factors have to be taken into account in arriving at the priorities for services which are to be converted from steam to diesel and electric, some of which are limiting factors, which act as restraints to the most desirable lines of action. The important factors are enumerated below :—

1. There are at present 29 classes of BG steam locomotives and 38 classes of MG steam. Of the BG, only 4 classes were manufactured at CLW and can rely on some kind of maintenance infrastructure. The remaining are unlikely to give useful services for any length of time even if they are retained. The bulk of the so called non-IRS locos be not, have useful lives extending beyond the Seventh Five Year Plan (1990), the exception being 5 CWD engines. The Committee, therefore, recommends that in the phasing out programme, all non-IRS locomotives are withdrawn from service before 1989-90, by which time rationalisation and modernisation of workshops would be hopefully complete. Even of the 4 IRS class locomotives all WT's, WM's and WG's can be phased out as has been brought out in Annexure A-7.4. Only WG locomotive may be kept on in service, but as brought out in Annexure A-7.4, advanced condemnation would be possible on these classes also. Similarly, on the MG, all types other than YG should definitely be phased out by 1989-90 along with some advanced condemnation of this class also.

2. From an operating viewpoint, the high density sections should be converted to modern forms of traction on the highest priority. On the BG, this would cover the routes connecting the four metropolitan cities, Mughaslarai-Lucknow-Jalandhar-Pathankot, Madras-Trivandrum, and Lucknow-Gorakhpur-Guwahati. On the MG, this covers Kasganj-Maipani-Dudwa-Gonda route via Gorakhpur and Delhi-Ahmedabad. The idea is that on these sections which may account for approximately 80% of the total BG goods traffic and 50% of the MG traffic, the high throughputs and traffic densities should be freed from the cumbersome and inefficient effect of steam traction in all forms.

3. After meeting the above requirements, we recommend that priority should be given to

shunting, departmental and work train uses in preference to through goods and passenger services. The steam locomotive is most inefficient when it is put to intermittent use. The engine cannot be switched 'ON' and 'OFF' unlike diesel and electric locomotives, and locomotive requirements, especially watering, reduces the actual time of useful work considerably. On passenger and through goods services, the steam locomotive is able to perform far better because of scheduling and time-tabling. The Committee would also recommend that in the context of the ambitious electrification and track renewal programmes which we have gone into elsewhere, it is vital that locomotives given for such departmental use are switched from steam to diesel in order to ensure sufficient project implementation.

4. Phasing out would have to take into account the limitation of axle load, on certain sections. This would necessitate reduction of speed on diesel locomotives for this purpose and the time required to build sufficient low axle load locomotives is, therefore, an important factor. Simultaneously, efforts have to be made in the track renewal programme to eliminate the totally non-standard light rail sections, so as to obviate the need to manufacture freak designs of diesels for use over a limited period.

- 4.5. In theory it may look necessary to give preference to MG for elimination of steam for the following reasons :—

1. The numbers are smaller and therefore, the whole system can be changed over at a much earlier date;
2. The MG areas of the Northern, Western, Southern and Northeast Frontier Railways are rather far-flung from the coal fields and change over to diesel would obviate the necessity for long steam-coal haulage and transshipment;
3. The quick upgradation of the MG system would modernise transportation and reduce pressure for conversion to BG.

4.6. Electrification, however, has started on an ambitious programme on the BG, entailing matching production of electric locomotives and elimination of steam locomotives on the electrified sections. That is understandably oriented to the consideration of traffic requirements. This will, therefore, have to be taken into account. In evolving a phasing out programme of steam, the following figures are of relevance :

1. Route Kms electrified at the beginning of Sixth Plan.	4,907
2. Anticipated additional coverage in 1980-85.	2,838
3. Anticipated additional coverage in 1985-90.	5,139
4. Anticipated additional coverage in 1990-95.	4,886
5. Anticipated additional coverage in 1995-2000.	4,372
Total	22,142

\* The production has not come up to this level this is on account of lack of funds.

\* This is keeping with the delineation of the routes indicated for electrification in Chapter VIII.



4.7. An increase in traffic in the coming years has also to be catered for in the phasing out programme. A broad picture of traffic increase is projected in Table 7.2 for the purpose of planning.

4.8. The Committee have already stated that on the high density electrified routes in the year 2000 AD, electric traction would handle 300 billion NTKM on the BG route and the balance to be handled by diesel will, therefore, be 37.5 billion. It is further assumed that out of the total passenger traffic on the BG, 70% i.e. 157 billion passenger-KM, would be on the electric traction and the balance 67 billion PKM on diesel. On the NG, all traffic would be dieselised. Figures given below indicate the requirements of electric and diesel locomotives for main line operation to handle this level of traffic at the turn of the century\*.

Table 7.2  
Profile of estimated traffic growth

	Broad Gauge		Metre Gauge	
	Freight Transport	Passenger Traffic	Freight Transport	Passenger Traffic
	billion NTKM†	billion PKM	billion NTKM*	billion PKM
1981-82	154	127	20	42
1984-85	207	131	23	43
1989-90	244	144	27	45
1994-95	282	178	32	50
1999-2000	337.5	224	37.5	56

#### 1. On Broad Gauge.‡

##### Electrics.

	$300 \times 10^6$	=	2,834
For goods	$290,000 \times 365$		
	$157 \times 10^6$	=	1,092
For passenger	$450,000 \times 0.875 \times 365$		
Total			3,926

##### Diesels.

	$37.5 \times 10^6$	=	447
For goods	$230,000 \times 365$		
	$67 \times 10^6$	=	582
For passenger	$360,000 \times 0.875 \times 365$		
Total			1,029

#### 2. On Metre Gauge.\*

##### Diesels.

	$37.5 \times 10^6$	=	734
For goods	$140,000 \times 365$		
	$56 \times 10^6$	=	487
For passenger	$360,000 \times 365 \times 0.875$		
Total			1,221

\* See Annexure A-7.3 for norms adopted.

† The above figures are based on estimates of 1981-82 and anticipations based on 375 billion NTKM and 320 billion non-suburban passenger kilometres in the year 2000 AD, as estimated in Chapter I earlier. A further 40 billion passenger Kms. which are eventually suburban like traffic are presumed to shift over to commuter mode thus leaving a balance of 280 billion for non-suburban passenger kilometre.

It is expected that 90M of the freight traffic and 80 % of the passenger traffic will be on the B.G.

‡ In these calculations certain efficiency parameters have been

3. The position may be summarised as under :

	BG Electric main line	BG Diesel main line	MG Diesel main line	Diesel shunters BG & MG & NG all purpose
Total number required at the turn of the century.	3,926	1,029	1,221	2,190
**Holding at the end of 31-3-1982.	1,086	1,564	478	480
Still to be acquired.	2,840	(—)535@	743	1,710

4.9. It is apparent from the above figures that while considerable production of electric, MG diesels and shunters is required, the BG diesel locomotives holding is already in excess of the requirement that will finally emerge, if the projections of the extent of electrification and traffic to be handled on electrified routes come about. Production of BG diesels, however, cannot be discontinued yet owing to the additional traffic immediately on the cards and the time that will elapse before sufficient electrification and electric locomotive production can suffice for the traffic arisings. Hence it is proposed to build these locomotives upto 1986-87 although at reduced and tapering levels. A proposed production plan is enclosed at Annexure A. 7.5 In these projections, no change in shunting requirements have been catered for.††

4.10. It is apparent that the existing production capacity is totally inadequate to meet the requirements of both additional traffic and the phasing out of steam as proposed.

1. Additional manufacturing capacity of electric locomotives will be necessary. In this context, a review has been made by the Committee of the existing capacity at CLW. As against the present theoretical capacity of 66, it will be required to increase it to 190 locomotives a year by 1991-92 in a graduated manner. It is necessary for the Railways to make a realistic assessment of how this will be achieved. During a discussion with the General Manager of Chittaranjan Locomotive Works at Chittaranjan in August 1982, the Committee could not get a specific response as to how far it is possible to increase the present rated capacity. If it is not possible to substantially augment the capacity at Chittaranjan Locomotive Works, the Railways have to think in terms of setting up a new

taken into account. Depending on the expeditiousness for implementation of the recommendations of the Committee in this Report, the efficiency factor may further improve. If that happens, it should be possible to economise on the production of diesel and electric locomotives in the programme of phasing out of steam.

\*\* Figures provisional.

@ This surplus would dissipate very fast. 181 will be due condemnation upto 2000 AD and another 546 in the next five years.

†† With more and more bulk traffic, it is not yet clear what the extent of shunting requirements will be. The present ratio of shunting hours to traffic generated is obviously misleading.



electric locomotive factory, which will take care of the additional requirement of locomotives even upto 2000 AD.

2. The capacity of DLW may have to be marginally raised from the present 150 upto 170, from now upto 1986-87, when further increase in the production of BG diesel locomotives should altogether be stopped. Within this marginal increase should be accommodated the requirements of steel plants and spare power packs. Depending on the promptitude and seriousness with which the Railways are able to implement the recommendations of the Committee, both in regard to the streamlining of operation as also the progress of electrification, it may be possible to narrow the margin between 150 and 170 diesel locomotives.

3. With its increasing commitments, CLW will certainly have no capacity to be saddled with low horse power BG diesel shunters and MG diesel locomotives. At the same time there will also be a need for accommodating the manufacture of the requirements of MG diesel shunters. In the opinion of the Committee, the Railways should explore the possibility of loading this to the non-railway sector. If need be, the engines for such locomotives can be manufactured in CLW and supplied to such manufacturers.

4. The possibility of developing a suitable battery operated electric shunter in electrified territory should also be seriously explored. This should work on the juice in the OHLE area, and on battery on the non-OHLE lines.

4.11. As per this production programme, the holding of locomotives of various types including shunting is indicated in Table 7.3 (page 253).

Table 7.3

Perspective of locomotive holdings

	Broad Gauge		Metre Gauge		Narrow Gauge	
	Steam	Diesel Elec.	Steam	Diesel	Steam	Diesel
Holding on 31-3-1982	3,975	1,966	1,086	2,423	478	340
Anticipated in 1989-90.	1,000	2,272*	1,934	450	1,078	150
Anticipated in 1994-95	55	2,747	2,869	143	1,358	Nil
	Steam totally eliminated in 1995-96		Steam totally eliminated in 1996		Steam eliminated	

4.12. The question at this stage arises about the surplus diesels that might exist at the turn of the century. It would be noted that as mentioned in paragraph 4.8 that there would a requirement of 1,029 B.G. main line diesels in the year 2000 AD as against 1,832 that will actually be available, giving a surplus of 803 locomotives. Over 700 locomotives will have outlived their useful life

upto 2005 AD and the remaining surplus may be required for further increase in traffic beyond 2000 AD. Furthermore, the proposed production plan covers 2,743 additional diesels, out of a projected requirement of 2,840, leaving a balance of 97 short. It is not entirely certain that 300 billion NTVM out of a total of 375 billion NTVM will actually have to be carried on electric traction as projected. This will depend on the progress of electrification and the actual build up of traffic outside the routes identified for electrification.

4.13. The build up of production capacity and the actual traffic arisings may not follow the pattern envisaged here. Constant reviews will, therefore, be necessary to readjust the long term plans. What the Committee have tried to highlight is :

1. It is possible to totally phase out steam from the high density routes within the next 7-8 years from and the entire system 5-6 years later.
2. A sharp increase is necessary in the production capacity. While the actual break-up may vary owing important thing is to organise capacity for the levels of production and recognise the need for some reliance on trade for lower horse-power diesels.

4.13.1. The Committee recommend that a corporate production programme is immediately drawn up to ensure that there is no shortfall on the locomotive side for handling the additional traffic in the coming years, and to cater to phasing out of steam as quickly as possible. The major aspects are

1. Stepping up of electric locomotive production capacity to 190 per year.
2. Stepping up DLW capacity from 150 per year to 170 per year.
3. Encouraging expansion of capacity in the non-railway sector even if engines are supplied by the Railways.

#### 5.0: Motive Power-the need for new types.

5.1. As early as December 1978, a specially constituted Committee of the Railway Board had drawn up a motive power plan. The Committee had gone into detailed needs of various types for the future and their conclusions are largely valid even today. Unfortunately, progress on evolving design has not been vigorous. Unless these new types are manufactured, not only would it become difficult to meet the projected traffic demands, but the steam locomotive fleet would have to be kept going merely to meet the needs of a particular horse power ranges, axle loads and applications. A brief mention of important types required to be developed is, therefore, relevant.

#### 5.2. Electric main line locomotive.

Electric locomotive technology needs to be brought up to date with the increase of not merely horse-power but also adhesion, through the use of better controls based on thyristors/choppers. Adequate horse-power has to be provided for trailing loads of 4,500 tonnes on 1 in 200 gradient at suitable speeds by employing two locomotives in multiple with an ability to start on a 1 in 100 gradient. For Mail and Express traffic, a separate design should be

\* After condemnation of 170 diesels.



necessary to haul 22 coaches with a speed capability of at least 140/kmph to start with, on the existing BG track provided with 52 kgs rail. The passenger locomotive must provide for hotel load of about 500 horse power.

### 5.3. Electric train sets.

We have identified the need for Electric Train Sets to be run on some-high density passenger sections for distances larger than normally catered for by electric multiple units.\* A few such train sets should be developed early and experimented with before taking up this expenditure seriously for some other routes.

### 5.4. MG Diesels.

The H.P. on the MG main line diesel is inadequate since it does not permit taking full advantage of the standard MG loop line. The Committee understand that the rating of the existing MG engine is already quite high and that experience abroad of unrating the engine further has been unsatisfactory. It would, perhaps, be better to adopt a 12 cylinder engine as in use in the first lot of 100 main line diesels imported from M/s. ALCO. This would necessarily increase the axle loads somewhat and therefore, the same locomotives could be used on Mail/Express service where 90-R rail is provided.

### 5.5. BG branch line locomotives.

There is an immediate need for suitable BG branch line locomotive with an axle load restricted to about 15 tonnes. The Motive Power Committee had recommended that such a locomotive be evolved by provision of the standard MG power pack, i.e. six cylinder 251-D engine on a BG locomotive for 1,380 gross HP. The Motive Power Committee had proposed that this be 1 4 axle locomotive. However, we note that with the 17 tonne axle load the speed will be restricted to and 50 kmph on the lighter rail sections. Further reduction in axle load is of course dependent on the ability of the Railways to replace the branch line track with heavier sections at an early date. Two such locomotives have since been manufactured. R&D effort should be directed towards further reduction in the axle load either by light-weight construction or by increasing the number of axles, if this does not give disproportionate increase to the total weight of the locomotive.

### 5.6. Light duty Diesels.

It is our opinion that for light duty diesels which will do duty as MG shunter and NG main line locos, it will be inappropriate to saddle the railway sector. The Committee would, therefore, suggest that for their production the Government should exploit the non-railway sector to the extent practicable. If necessary, engines can be supplied by the Railways.

### 6.0. Diesel rail-car sets.

6.1. The role of diesel locomotives would have to be limited mainly to the smaller density routes in future. These densities refer to bulk goods movement and it is possible that on some of these less dense routes, there is considerable passenger movement, which is uneconomical to haul by road or conventional locomotive-hauled trains and which would not give the required standard of services, especially in the 'rush-hour'. The answer lies in diesel car sets of light weight, of EMU type construction, and with relatively quick acceleration/deceleration. Deve-

lopment of these rail car sets based on a motor coach intermediate failure should be the responsibility of the coach manufacturing unit. The transmission may be electrical in case hydraulic cannot give the desired acceleration, especially if the passenger loads are heavy enough to justify multiple units. This will be an especially attractive proposition for commuter-like services near large towns and cities where the capital outlay for electrical commuter services is considered to be too heavy. The services can, of course, be conveniently changed to electric as traffic picks up to economical levels and the resources can be found. A fresh experiment on one or two selected routes is recommended, before their use on a commercial basis.

6.2. The Motive Power Committee had identified the need to uprate the 12 cylinder 251-B engine to site horse power of 2,300 and use two locomotives in multiple for high speed passenger services while also providing for hotel load. It was also envisaged that with uprating of the 12 cylinder engine in due course, production of 16 cylinder engines can be discontinued. As the proposed production plan indicates that main BG line diesel locomotives need not be manufactured beyond 1989-90 development of an uprated engine must be taken on with urgency.

6.3. In the more distant perspective, the possibility of developing a suitable battery-operated electric shunter in the electrified territory should also be seriously explored; this could be fed by OHE in the wired lines and on batteries elsewhere.

### 7.0. Perspective for development of diesels.

7.1. Diesel Locomotive to day account for barely 3% of the country's requirement of POL. While the electrification programme as envisaged would indicate that not many inputs are required for diesel locomotive technology in future, it is relevant to note that if the entire traffic by the turn of the century were to be handled by diesels, the total consumption of POL by the Railways would rise to 4 million tonnes and may, at that time, not account for very much more than 5% of the country's POL needs. It is, therefore, to be appreciated that diesel traction by itself does not imply very severe strain on the foreign exchange resources as a proportion of the total. The extent of diesel traction may conceivably, be higher than indicated in the perspective planning on account of the various constraints in progressing electrification. It will, in any case, continue to be a preponderant form of traction for shunting duties and, therefore, must receive all the necessary inputs to keep technology abreast of international developments.

7.2. The Committee, therefore, recommend that the requisite research should continue†.

### 8.0. Conclusions.

8.1. Steam traction has outlived its role and should be quickly phased out. It should be possible to phase out steam locomotives from the high-density routes by 1989-90 and on the complete network by 1996-97. To achieve this, a corporate production plan should be evolved for the manufacture of diesel and electric locomotives. The time-table suggested by the Committee is a fairly conservative projection that also takes care of additional traffic requirements. A faster phase-out can be possible if the efficiency parameters are improved upon considerably on the basis of a serious time-bound implementation of the recommendations made by this Committee.

\* Para 9.8 of Chapter VIII on Railway Electrification.

† The Committee propose to deal with the entire range of research

and development on the Railways in depth in a later part of their report.



8.2. In order to keep pace with the electrification effort, the production of electric locomotives at Chittaranjan needs to be maximised. The Committee feel that the Government should consider the need for setting up another electric loco manufacturing unit seriously and take an early decision. While doing so, electric locomotive technology should be updated to ensure full realisation of the potential of electric traction.

8.3. The capacity of DLW may have to be marginally raised from the present 150 to 170, from now to 1986-87,

when further increase in the production of BG diesels should be stopped. Within this marginal increase should be accommodated the requirements of steel plants and spare power packs. Depending on the efficiency parameters, it may be possible to narrow the margin between 150 and 170 diesel locomotives.

8.4. This is the right time to develop the specifications and horse power ranges of locomotives for specific usages. This is particularly relevant for electric locomotives.

### ROLLING STOCK

ANNEXURE A-7.1  
Cf. Para 2.1

Locomotives	1950-51	1955-56	1960-61	1965-66	1970-71	1975-76	1976-77	1977-78	1978-79	1979-80	1980-81
Steam	8,120	9,206	10,312	10,613	9,387	8,496	8,345	8,215	8,082	7,856	7,469
Diesel	17	67	181	727	1,169	1,803	1,903	2,025	2,126	2,243	2,403
Electric	72	79	131	403	602	796	847	901	945	974	1,036
Total	8,029	9,172	10,624	10,743	11,158	11,095	11,195	11,141	11,153	11,073	11,098

ANNEXURE A-7.2  
(Cf. Para 3.3)

### COMPARATIVE COST OF SERVICES (STEAM & DIESEL)

Broad Gauge.				= Rs. 78.8 crores		in Goods considering General Goods.	
Cost of Goods Traffic in 1979-80	Diesel	Steam	Passenger.—	= Rs. 36.8 crores		in Goods considering Through Goods.	
				$(20.86 - 12.99) \times 43.47 \times 10^9$			
				$= 10^9$			
(a) General Goods	Rs. 10.9/1000 GTKM	Rs. 5.5/1000 GTKM		$= \text{Rs. } 342 \times 10^9$			
(b) Through Goods	10.8	31.7		$= \text{Rs. } 34.2 \text{ crores.}$			
Cost of Passenger Traffic.	12.99	20.86					
Metre Gauge.				= 787.19 $\times 10^9$			
				$= \text{Rs. } 78.8 \text{ crores}$		in Goods considering General Goods.	
(a) Goods	15.88	38.186		$= \text{Rs. } 36.8 \text{ crores}$		in Goods considering Through Goods.	
(b) Passenger	20.30	32.740					
Source Goods : (a) Summary of End results Freight Services 1979-80 published by Ministry of Railways.				$(20.86 - 12.99) \times 43.47 \times 10^9$			
(b) Cost Analysis of Coaching Services 1979-80 published by Ministry of Railways.				$= 10^9$			
				$= \text{Rs. } 342 \times 10^9$			
				$= \text{Rs. } 34.2 \text{ crores.}$			

### SAVINGS

#### Broad Gauge.

Traffic on Steam in 1980-81

—  $17.65 \times 10^9$  GTKM Goods  
—  $43.476 \times 10^9$  GTKM Passenger

Goods.—

Savings on freight

$(55.5 - 10.9) \times 17.65 \times 10^9$   
 $= 10^9$

#### Metre Gauge.

Goods.—

Traffic on Steam in 1980-81

$= 9.6 \times 10^9$  GTKM Goods  
 $= 22.78 \times 10^9$  „ in Passenger

∴ Savings in Freight

$(38.18 - 15.88) \times 9.6 \times 10^9$   
 $= 10^9$   
 $= 214 \times 10^9$   
 $= \text{Rs. } 21.4 \text{ crores.}$

Passenger.—

$(32.74 - 20.30) \times 22.78 \times 10^9$   
 $= 10^9$   
 $= 283 \times 10^9$   
 $= 28.3 \text{ crores.}$



**Hence Savings at 1979-80 costs.****(a) Considering Through Goods Traffic.**

$$= 36.8 + 34.2 \times 21.4 + 28.3$$

$$= \text{Rs. 120.7 crores}$$

Escalated\* to

$$= \text{Rs. 157 crores at 1981-82 price levels.}$$

**(b) Considering Overall Goods.**

$$= 78.7 = 34.2 + 21.4 + 28.3$$

$$= \text{Rs. 162.60 crores}$$

Escalated\* to

$$= \text{Rs. 212.50 crores at 1981-82 price levels.}$$

\* Escalation as per Railway Board's letter No. 81/CA;(Stat.)/Goods/18, dated 18-1-1982.

**ANNEXURE A-7.3**

(Cf. Para 42)

**NORMS FOR TRAFFIC HANDLING BY VARIOUS FORMS OF TRACTION****BROAD GAUGE.****A. Freight.****A-1. Steam.**

In 1980-81, Steam locomotive handled 11,781 NTKM per goods locomotive in use. As will seen in the body of the report, this figure does not enter into the calculation of future projections for 1989-90 and 1994-95 since all steam goods traction on BG will have been eliminated.

**A-2. Electric.**

Railway Board, vide their position paper on Traction Policy submitted to the RRC, has indicated a target of 240,000 NTKM per loco day in use for diesel traction. It is seen that on the basis of usage vide Statement No. 22 of the Railway Board Annual Statistical Statement 1980-81, the shunting element depresses the line haul NTKM by approximately 21%. Hence Line haul NTKM target per loco day in use should be  $240,000 \times 1.22 = 292,800$ . Electric line haul target assumed to be 15% higher with increased electrification and modernisation i.e.,  $292,800 \times 1.15 = 336,720$  per loco day in use and 292,125 rounded off to 290,000 NTKM per loco day on line (based on the targetted 12.5% ineffective). With the gradual implementation of the recommendations of the Committee, it should be possible to improve on the efficiency factor, depending on how fast and serious the implementation is and this may obviate the need for expansion of DLW.

**A-3. Diesel.**

With progressive electrification and taking over of inferior services, Diesel line haul NTKM to drop by 10% from the target level of 292,800 to 263,520 NTKM per loco day in use. 230,580 rounded off to 230,000 per loco day on line (with the targetted 12.5% ineffective).

**B. Passenger.**

**B-1.** In 1980-81, the passenger km. per vehicle km. was 31.1. (Statement Nos. 12 & 19(A) of Annual

**Statistical Statement, (Railway Board).**

The vehicle kms. per loco day in use were :

Diesel ..	17,862	Figures of 1980-81 Statement Nos. 19(a) and 22 of Annual Statistical Statement.
Electric ..	11,618	
Steam ..	3,760	

By conversion, this would give passenger km. per loco day in use as follows :

Diesel ..	555,508
Electric ..	361,319
Steam ..	116,936

The average of diesel and electric adopted for both these tractions upto 1990 AD and latter diesels to drop by 20.0% with the taking over of slower branch line passenger services.

$$\begin{aligned} \text{B.2 Diesels and Electrics} & \quad 555,508 + 361,319 \\ \text{to give} & \quad = \frac{\quad}{2} \\ & \quad = 458,413 \text{ rounded off to} \\ & \quad 450,000 \text{ Passenger Km.} \\ & \quad \text{loco day in use.} \end{aligned}$$

**B.3** After that diesels to give 360,000 PKM/Loco day in use.

**B.4** Steam to give 115,000 PKM/Loco day in use.

**C. Shunting.**

It is presumed that on an average 1.5 steam locomotives will be replaced by one diesel locomotive. Provision of Steam over bare of shunting services=13%. Diesel ineffective = 12.5% Hence requirement to replace 1371 steam shunters on power plan=

$$1371$$

$$1.13 \times 1.5 \times 0.875$$

$$= 924.39 \text{ or say } 920.$$

**D. Departmental.**

1 Diesel to replace 2 steam locomotives.  
provision of steam over bare .. 13%

Diesel ineffective .. 12.5%

Hence replacement of 396 steam locomotives will be done by

$$396$$

$$1.13 \times 2.0 \times 0.875$$

$$= 200.25$$

or say 200

**METRE GAUGE.****A. Freight.****A-1. Steam.**

The steam locomotive handled 17,868 NTKM loco day in use. As will be seen in the body of the report, this figure does not enter into the projections for 1989-90 onwards since steam will have been eliminated.



**A-2. Diesel.**

In 1980-81, diesels gave 139,587 NTKM per loco day in use and this was the same figure as line haul NTKM/loco day in use since there was virtually no diesel shunting. It is expected that this figure would rise by about 15% by improvement in efficiency on the Metre Gauge System.

Hence NTKM norm adopted

= 160,000 NTKM/loco day in use.

= 140,000 NTKM/loco day on line.

**B. Passenger.**

In 1980-81, the passenger km. were 27.5 per vehicle km. (Statement No. 12 and 19 (a)). The vehicle km. per loco day in use were.

Steam .. 3261

Diesel .. 14648

B-1. Giving Steam 89,677 rounded off to 89,000 Passenger per loco day in use.

and

B-2. Diesel 402,843 dropping by 10% with inferior services to 360,000 passenger km./loco day in use.

**C. Shunting.**

Same norms as in BG i.e. one steam to be replaced by 0.67 diesels.

Hence 620 steam to be replaced by 415 diesels.

**D. Departmental.**

Same as in B.G. i.e. one steam to be replaced by 0.5 diesel.

Hence 83 steam to be replaced by 40 diesels.

**NARROW GAUGE.**

1 Diesel to replace 2.5 steam.

Hence 340 steam to be replaced by 135 diesels.

ANNEXURE A-7.4  
(Cf. Para 4.4.1.)

**POSITION OF TRACTION LIKELY TO OBTAIN IN 1989-90.****A. BROAD GAUGE.**

(1) Total number of main lines .. 1,934  
Electric Locomotives available.

(2) Total number of main line .. 1,832  
Diesel locomotives available.

Total BG Traffic to be handled  
..  $244 \times 10^9$  NTKM and  $144 \times 10^9$  PKM.

The deployment of electric locomotives is assumed on the same need-based mix as shown on Page No. 250 i.e. 67% on goods and 33% on passenger services. Thus 1296 on Goods and 638 on passenger.

Hence electric locos will haul :

Goods.  $1296 \times 290,000 \times 365 \times 137 \times 10^9$  NTKM  
leaving a balance of  $107 \times 10^9$  NTKM.

and

Passenger.

..  $638 \times 450,000 \times 365 \times 0.875 = 91.5 \times 10^9$  PKM  
leaving a balance of  $52.5 \times 10^9$  PKM.

Diesel locos required :

For Goods

$$= \frac{107 \times 10^9}{230,000 \times 365} = 1,275$$

For Passenger

$$= \frac{52.5 \times 10^9}{450,000 \times 365 \times 0.875} = 365$$

Total = 1,640

Hence surplus diesels

$$= 1832 - 1640 = 192$$

Scrapping 170 WDM's, WDM's etc. = 170

∴ Surplus available for shunting. = 22

For shunting and departmental services, additional diesels available :

= 65 from CLW

= 255 from DLW

= 120 from Trade with CLW power Packs.

= 22 Surplus—main line  
462 Out of a total requirement of 1120. Presuming that 300 will be for shunting and 162 for departmental.

Steam locomotives still required :

924 for shunting and

76 for departmental

Total 1,000

Thus, the No. of shunting and departmental locomotives will be roughly, 862 diesel and 1,000 steam. A quick estimate shows that this is sufficient to totally withdraw steam from the high density routes on BG.

No. of steam that can be laid off = 2,975  
between 1982-83 and 1989-90.

The balance 1,000 steam would be all WG's manufactured after 1960. It is concluded that between now and 1990 Railway should condemn an average of 425 steam locomotives per year and condemn all types other than WG on the WG's codal life may be re-fixed at 30 years.



### POSITION LIKELY TO OBTAIN IN 1994-95

Total number of main locos available. 2,869

of which 2,008 on Goods and 861 on Passenger.

Traffic to be handled

=  $282 \times 10^6$  NTKM and  $178 \times 10^6$  PKM.

These locos will haul :

Goods

$2008 \times 290,000 \times 365 = 212.00 \times 10^6$  NTKM.

leaving a balance of  $70 \times 10^6$  NTKM.

and

Passenger

$861 \times 450,000 \times 0.875 \times 365$   
=  $123 \times 10^6$  PKM.

leaving a balance of  $55 \times 10^6$  PKM.

Diesel locomotives required :—

For Goods

=  $\frac{70 \times 10^6}{230,000 \times 365}$  = 834

For Passenger

=  $\frac{55 \times 10^6}{360,000 \times 365 \times 0.875}$  = 478

Total ... = 1,312

No. of diesels available less

= 1,640  
170  
already scrapped

i.e.

1,470  
158  
surplus

Shunting

For shunting and departmental services, locos produced between 1989-90 and 1994-95.

= 300 from DLW

175 from Trade with CLW Power Packs.

Total = 475

Total already produced between 1982-83 and 1989-90.

= 450

Grand Total = 925 leaving a balance of  $1120 - 925$   
= 195 which 158 surplus main line will largely cover. Balance steam = 55.

Hence steam locomotives to be totally discarded by 1995.

### B. METRE GAUGE

#### POSITION LIKELY TO OBTAIN IN 1989-90

Total number of line-haul diesels that will be available

=  $478 + 500$   
= 978.

Traffic to be handled

=  $27 \times 10^6$  NTKM and  $45 \times 10^6$  PKM.

Diesel locos required :

Goods

=  $\frac{27 \times 10^6}{140,000 \times 365}$   
= 528 leaving a balance of 450 for Passenger.

Passenger

=  $\frac{45 \times 10^6}{360,000 \times 365 \times 0.875}$  = 391  
i.e. a surplus of 59.

Shunting and Departmental

The additional diesels that will become available between 1982-83 and 1989-90—

= 120 from Trade of which 100 presumed to be MG and 20 NG).

Presuming that out of these, 80 MG locos will be for shunting and 20 Departmental.

Locos required for Shunting  
= 415

Made available (80 + 59 surplus main line)  
= 139

Balance = 276 equivalent to 408 steam.

and a balance of 20 for departmental equivalent to 42 steam.

Hence total steam still in service

=  $408 + 42$   
= 450.

1973 steam can be laid off between 1982-83 and 1989-90 at the rate of 280 per year. The balance steam will be YG's manufactured after 1960. Thus all other classes should be scrapped and codal life of YG's reduced to 30 years over this period.

#### POSITION LIKELY TO OBTAIN IN 1994-95

Total Diesel locomotives available  
= 1208

Traffic to be handled

=  $32 \times 10^6$  NTKM and  $50 \times 10^6$  PKM.

Locos required

For Goods :—

=  $\frac{32 \times 10^6}{140,000 \times 365}$  = 626



*For Passenger.*

$50 \times 10^6$	
$360,000 \times 365 \times 0.875$	434
Total	1060

Leaving a balance of 148 that  
can be used for shunting.

*Shunting and Departmental :*

Out of the 125 locomotives manufactured between  
1989-90 and 1994-95, presuming that 75 are for NG,  
extra available on MG.

= 50
Also from surplus main-line
= 148
Total = 198

20 will be allowed for departmental, completing the  
change-over and 178 available for Shunting, leaving  
a net shortfall of 96, equivalent to 143 steam, which  
can be made up in the next year, i.e. 1995-96.

**C. NARROW GAUGE.**

Manufactured between 1982-83 and 1989-90

= 60

Manufactured between 1989-90 and 1994-95

= 75

Total = 135

Total requirement 135. Hence steam eliminated.

**ANNEXURE A-7.5**  
(Cf. Para 4.9)

**Proposed Production Programme for Locomotives.**

	*82-83	83-84	84-85	85-86	86-87	87-88	88-89	89-90	90-91	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	1999-2000
1. Electric Locomotives BG, Diesel line-haul NG.	57	66	75	100	115	130	145	160	175	190	190	190	190	190	190	190	190	190
3. Diesel line haul MG.	15	20	35	65	80	95	95	95	80	60	40	30	20	An average replacement requirement of 75 locos + 75 Power Packs on a continuous basis subject to traffic trends.				
4. Diesel Heavy duty shunter BG.	10	15	30	40	40	40	40	40	60	60	60	60	60					
5. Diesel Lower HP Shunters at CLW BG.	15	20	20	10	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6. Diesel Narrow Gauge at CLW.	5	20	15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7. MG & NG Diesels from Trade.	...	...	5	20	20	25	25	25	25	25	25	25	25	...	...	...	...	...
8. Low HP Diesel Shunters from Trade—BG with Power Packs from CLW.	...	...	5	10	20	20	30	35	35	35	35	35	35	...	...	...	...	...

	*82-83	83-84	84-85	85-86	86-87	87-88	88-89	89-90	90-91	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	1999-2000
A. Capacity of Electric Loco Production at CLW (additional Plant if necessary.)	66	66	75	100	115	130	145	160	175	190	190	190	190	190	190	190	190	190
B. Capacity at DLW Less Power Packs & Outside Sales Available to Railways as Locomotives.	150	150	160	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170
	42	35	35	35	35	35	35	35	35	35	35	35	35	As per requirement				
	108	115	125	135	135	135	135	135	135	135	135	135	135					
C. Capacity of Diesels at CLW.	45+	45+	35+	10	20PP	20PP	30PP	35PP	35PP	35PP	35PP	35PP	35PP	-do-				
D. Total capacity of Trade for Railways inclusive of those with CLW Power Packs.	...	...	10	30	40	45	55	60	60	60	60	60	60	-do-				

**N.B.**—\* Actual Production Plans. PP—Power Packs.



## CHAPTER VIII

### RAILWAY ELECTRIFICATION

#### 1.0. Introduction.

1.1. A study of the evolution of railway electrification, indicates tentative and adhoc progress, devoid of a basis of a perspective period-plan. Electrification started with commuter services, and more or less remained confined to commuter movements of a few metropolitan areas for a long time.

1.2. It was only towards the end of Fifties, with the plan-oriented speedier industrialisation of the country, that electrification of the trunk routes was also commenced.

1.3. The pace of electrification, which had picked up in the preceding plan periods, slackened in the seventies. This would be evident from Table 8.1 indicating the plan allocations for Railways Electrification and the route kilometres electrified.

Table 8.1

**Plan allocation for railway electrification**

Plan period	Plan	Railways' overall plan expenditure	Plan expenditure for railway electrification	Route kms. electrified
(In crores of rupees)				
1956-61	II	1,044	47.00	216
1961-66	III	1,686	80.81	755
1966-69	3 (Annual)	763	36.14	905
1969-74	IV	1,420	70.04	956
1974-78	V (4 years)	1,548	78.10	531
1978-80	2 (Annual)	1,215	41.60	194
1980-85	VI	5,100	450.00	2,800 (proposed)

1.4. The momentum gained during the Third Five Year Plan was allowed to taper off. The year 1974 became the watershed year making a distinct slowing down of electrification and the nadir was reached in 78-80. It is only now, during the Sixth Five Year Plan, that the Government have sanctioned electrification as a serious instrument of growth. In fact, in certain quarters, the Sixth Five Year Plan has been christened as a 'a plan for rehabilitation and electrification'. To a large extent, this renewed emphasis on electrification is also because of the world-wide oil crisis manifest not only by an acute shortage in the availability of oil, but also in a steep price-escalations.

1.5. The National Transport Policy Committee had done considerable research work in the area of energy

conservation and in identifying an optimal intermodal mix to meet the growing needs of the transport sector. It has very categorically recommended that in view of the very limited oil resources and also because the country is richly endowed with coal and hydro potential the future pattern of energy supply in the transport sector should broadly conform to future pattern of energy supply in the country. This implies that the modal mix should favour modes which use electric power.

1.6. The recommendations of the Working Group on Energy Policy\* have also underscored this strategy and suggested that future Government planning should be based on the following considerations :—

1. Commercial energy requirements should be based mainly on coal.
2. Development of indigenous oil resources should be intensified and the existing sources optimised.
3. Conservation of energy sources should become the overriding priority; and
4. Substitution of oil wherever possible should be attempted and wherever necessary pricing policy should encourage substitution by the desired type of fuel.

#### 2.0. Emergence.

2.1. Railway electrification on Harbour Branch in Bombay areas was envisaged primarily to meet the needs of suburban traffic. The Harbour Branch line had a short stretch of gradient of 1 in 34 on a heavy curve. It was realised that an intensive suburban service could not be operated by steam traction on such a gradient and accordingly electrification was the only alternative. The extension of electrification upto Kalyan on Central Railway and electrification on Bombay-Virar and Madras-Tambaram was also similarly undertaken to meet the needs of suburban traffic.

2.2. The reasons for electrification of main line upto Igatpuri and Pune were, however, different. The Ghat section on both the routes with heavy gradients of 1 in 37 became a serious bottle-neck for expeditious movement of trains, both freight and passenger. Electric traction was found to be the ideal solution under such circumstances.

2.3. Electrification during the period 1925 to 1936 and again in 1954 was considered basically either to meet the needs of suburban traffic, or to haul the traffic on heavily graded sections. Steam traction which was the only competitor at that time (diesel traction had not appeared by then in a big way) was incapable of providing intensive suburban services which required fast acceleration and deceleration and frequent stops and starts

\* This Working Group was set up by the Central Government in December, 1977 and submitted its Report in 1979.



as well as hauling heavy trains on severely graded sections due to its inherent limitations.

2.4. In the Sixties, with accelerated traffic growth, the scene had changed. Diesel traction became available as an alternative. The Railways had imported a fleet of 100 diesel electric locomotives in 1958-59 from U.S.A. for meeting the traffic needs on congested routes of Eastern and South Eastern Railways as an interim measure before electrification was introduced on these sections. In view of the availability of an alternative mode of diesel traction at that point of time, which had also the advantages of being introduced at comparatively short notice without heavy capital out-lays and the flexibility of being switched over from one section to another, it was considered that diesel traction was suitable for sections where traffic densities were likely to remain low for a reasonable long period and could be a forerunner to electric traction on sections where traffic densities were likely to grow sufficiently later on. It, therefore, became imperative to undertake a techno-economic study of both modes of traction to determine the norms for undertaking electric/diesel traction on different sections.

### 3.0. Economies.

3.1. Two studies were undertaken to decide on the electrification projects : one by Sahai Committee in 1963 and another by Raj Committee in 1978, \* the Sahai Committee concluded that beyond a certain traffic, density, electric traction becomes cheaper and the 'break-even level' of traffic density comes down further as the grades becomes steeper. At the level of prices prevalent then, the break-even point between diesel and electric traction was between 6-7 million trailing tonne kms. per route kilometre per annum. The break-even level was estimated to go up to 20 to 30 million trailing tonne kms. per route km. per annum in case element of customs duty on diesel oil was not taken into consideration. It also recommended examination on given guidelines of each individual project for deciding on its electrification.

3.2. Consequently all electrification schemes upto the Fifth Plan were justified financially in comparison to diesel traction before being sanctioned and taken up. This approach resulted in electrification of piecemeal sections, which were carrying heavy traffic in preference to electrification of a complete route, which could have avoided change of traction in between sections. Thus a total integrated view was not taken which would have favoured optimisation, reduced number of trains and faster movement of traffic. The piecemeal electrification of sections came in the way of fuller exploitation of electric traction and depressed the utilisation indices of electric rolling stock.

3.3. In 1978, Raj Committee was appointed to undertake another techno-economic study of electric traction versus diesel traction, as by then, the entire cost structure of all the inputs including those of diesel oil and electricity had changed substantially. The Committee included experts from the Planning Commission and the Railways. Raj Committee decided the break-even level between diesel and electric tractions as under :—

	Internal rate of return	Break-even level on the basis of Million GTKM/RKM/annum	Without	With
			CLS	CLS
Financial study ..	10%	29.5	31.5	
Economic study ..	12%	28.00	30.25	

\* There was also an independent study of the National Council of Applied Economic Research in the late sixties.

3.4. Realising that the 1978 price level had materially altered over the years, we also set up a Working Group on Railway Electrification and had asked them to go into this aspect. The Group has updated the break-even levels between diesel and electric traction, which is incorporated as Annexure A-8.2. The conclusions are briefly indicated in paragraphs that follow.

3.5. At present-day level of inputs and prices, the break-even level of traffic density where electric traction should give a 10% IRR (Internal Rate of Return)† over dieselisation, works out to 18.57 million GTKMs/RKMs per annum. With the economic cost and with a 15% premium on foreign exchange (shadow exchange rate) the break-even level works out to 13.09 million GTKM/s RKMs per annum.

3.5.1. The break-even level based upon present economic cost is lower than computed on the basis of financial cost, while in the past, the break-even level on economic cost, was always higher than on financial cost. This reversal has taken place on account of substantial increase in the landed price of imported oil (without considering the duties) due to which economic costs have shown an edge over the financial costs.

3.6. A programme of electrification in the coming years on routes with a traffic density about 19.5 GTKMs/RKMs per annum, this being the break-even level at financial costs as updated by our Working Group, is recommended.

3.7. The traffic density figures for justification of electrification projects for a perspective plan are to be treated only as notional. As it is, based on this level, about 9,000 Route Kms. are already justified for electrification. In the coming years, depending upon the escalation of diesel oil prices, the break-even levels may come down further. This would justify the speedy implementation of the Government policy for accelerating the electrification effort on the Railways. The major consideration would be the rapid depletion of scarce oil resources in the country and in the world and the necessity to earmark this 'dying asset' for usage, which have to necessarily depend on oil, such as Defence services, air and road transport, agriculture etc. A strategy of growth for the Railways should not therefore, be made dependent on oil.

### 4.0. Present scenario.

4.1. Today on the Railways about 5,500 route kms. of high density routes have been electrified which account for nearly 26 per cent of the total Gross Tonne Kilometres Diesel and steam traction cover the rest of the 60,000 Route Kms. in the country. On this network diesel traction accounts for 55 per cent and steam traction 19 per cent of the total Gross Tonne Kms.

4.2. In 1979-80 the Indian Railways used 11.39 million tonnes of coal (11 % of the total raised in the country), 0.98 million KL of H.S.D. (8.5 percent of the total which is consumed in the country) and 21.53 GWH of electricity (1.9 per cent of the total electricity generated in the country). The consumption trend on the Indian Railways are indicated in Graph GI at Annexure A-8.1 to this Chapter.

### 5.0. Future Strategy.

5.1. In the light of the above and with the latest emphasis on conservation of energy the Government has

† IRR is the 'Internal Rate of Return' and signifies the rate obtainable when the 'net present value' becomes zero.



accorded high priority for electrification of the Railways and as a consequence the Railway Board have drawn up a 10 year programme on electrification upto 1980-90. The programme envisages energisation of 2,800 route Kms. as already provided in the Sixth Plan and 5,000 route Kms. in the Seventh Plan. The total cost on the basis of 1980 prices has been estimated at 450 crores during the Sixth Plan period and 750 crores in the Seventh Plan period. It has been proposed to increase the construction activities in order to achieve electrification of 1,000 Route Kms. per annum in the shortest possible time.

5.2. As a consequence, by 1990 the above programme of electrification if fully implemented would result in total energisation of 12,800 Route Kms. representing 21 per cent of the Indian Railways network. This would enable 65 per cent of the total GTKMs on Indian Railways to be carried on electric traction which would require 6,466 GWH of electricity, equivalent to 1.53 million tonnes of HSD valued at Rs. 550 crores at today's prices.

#### 6.0. Perspective programme.

6.1. In consideration of all these factors, the Committee would recommend that all trunk routes connecting the metropolitan cities (which have a heavy density of traffic), should be electrified on the basis of a time-bound programme to be completed by 2000 AD.

6.2. The routes which have a traffic density of 18/19 million GTKMs/RKMs even at present day levels of traffic are the following :—

1. Delhi-Bombay Central route, via Western Railway.
2. Delhi-Bombay-VT route, via Central Railway.
3. The remaining unelectrified Delhi-Madras Central-Secunderabad route via Central, South Central and Southern Railways. There are three sections, namely, Itarsi-Nagpur, Wardha-Belampalli and Kazipet-Secunderabad, where the present density is less than the break-even level. Similarly, on Bombay-Calcutta route, Nagpur-Durg Section has also a traffic density less than the break even level. These sections, however, have to be electrified for continuity of traction.
4. Sitarampur-Mughalsarai section of Eastern Railway.
5. Arkonam-Erode, via Jollarpatti-Madras-Arkonam-Renigunta.
6. Mughalsarai-Varanasi and Lucknow-Jalandhar City via Moradabad, Saharanpur, Ambala Cantt. of Northern Railway.
7. Bina-Katni-Anup Pur Section of Central and South Eastern Railways.

6.3. The Committee have thus concluded that, the main routes connecting Delhi to Bombay (via Central and Western Railways), Delhi to Madras, Bombay to Calcutta, Mughalsarai to Sitarampur (main line of the already electrified Delhi-Calcutta routes as also Mughalsarai-Lucknow-Jalandhar City (the alternate route to the existing electrified Mughalsarai-Delhi route) and to a few of the other routes indicated above, are already justified for electrification.

6.4. The above programme would cover Delhi-Bombay, Delhi Madras and Delhi-Calcutta routes, along with sections, which link the main electrified streams of traffic, by and large, however, there are certain other sections, listed below, which would also be justified for inclusion, considering the heavy traffic growth expected in the coming years :—

1. Bilaspur-Anup Pur
2. Bhopal-Nagda
3. Tundla-Agra-Bayana
4. Jollarpattai-Bangalore
5. Barsua-Bimalgarh-Bondamunda-Hatia-Muri-Bokaro.
6. Sonnagar-Barakhana
7. Jalandhar City-Amritsar

6.5. The principal segments of the main routes between Bombay and Madras and Madras and Howrah via the East Coast are not as yet justified financially at the present traffic densities. However, considering that originating freight traffic is expected to increase from existing 215 million tonnes to about 600 million tonnes by the end of the century, it is felt that these routes will also witness proportionate growth of traffic and by the end of the Seventh Five Year Plan, the increased traffic densities would justify electrification of these sections as well. These sections may, therefore, be included in the perspective programme for electrification up to 2000 AD.

#### 7.0. Strategy for accelerated electrification.

7.1. In the sixties an average rate of energisation of 350 kms. per annum was achieved and for this a suitable infrastructure was built. Gradually, however, the rate of energisation dropped down to 130 RKM/annum during the Fifth Five Year Plan and the organisational infrastructure was substantially diluted and dispersed.

7.2. The energisation during the first two years of the Sixth Plan is given below :—

<u>Year</u>	<u>Target</u>	<u>Actual</u>
1980-81	438 RKMs	438 RKMs
1981-82	321 RKMs	111 RKMs
Total	759 RKMs	549 RKMs

The Sixth Plan, while spearheading the efforts of electrification on the Railways, planned for an energisation of about 321 kms. in 1981-82. The slippage from this target is evident. This indicates the adoption of a diluted policy towards electrification effort by the Railways, which does not appear to be in conformity with the decision of the Government. The Government had decided that the Railways should energise 1000 Route Kms. per annum during the Sixth Plan. This target, however, was found to be too ambitious because of the lack of infrastructure, which more or less ceased to exist over the years. The Committee, fully support the accepted policy of the Government for accelerating the energisation effort and would strongly recommend that the Railways must proceed with the commitment of the Sixth Plan by achieving at least an annual rate of energisation of 500/600 Route Kms. and for creating the requisite infrastructure to achieve an accelerated rate of 1,000 Route Kms. and even more in the Seventh Plan and beyond. This will require appropriate infrastructure and mobilisation of men, material and resources, innovation of modern scientific methods of construction, appropriate devolution of authority to the project organisation with resultant simplification of procedures and avoidance of red tape to cut down delays in decision making.



7.3. In this context, the Committee would make a number of suggestions.

7.3.1. Electrification Projects in the Board may be put under a very senior executive,\* who should be directly responsible for this work to the concerned Member. This may be done by re-designating the present post of Adviser (Electrical) as Director General (Electrification) and making him exclusively responsible after vesting him with necessary powers.

7.3.2. Depending on the programme of electrification taken up for execution for a particular Five Year Plan, the country should be divided into two or three project zones, like the South, the Central and the North, and each such zone should be under the control of a specially selected Senior Manager.

7.3.3. The Officer-in-charge of such a Zone should ensure the following :

1. All the projects in his charge should be executed on modern management techniques, in relation to administration, finance, technology, management and project-implementation.
2. The contract conditions should be coordinated between the project zones, in order that jumping of rates are avoided and similarity of standard and quality assurance are ensured.
3. Materials are procured in bulk, Depending upon the progress of individual projects, inter-project and inter-zonal transfer of materials should be coordinated at the Project Zonal level.

7.4. To ensure that the pace of electrification is not only built up but also sustained at fairly satisfactory levels, it is recommended that the requisite volume of funds are committed for electrification upto the end of each Five Year Plan right at the commencement of the Plan, and are not curtailed or adjusted from year to year.

7.5. Indigenous capacity for manufacture of certain components is adequate for the growing needs of an accelerated programme of electrification ; and immediate and programmed action is required to be taken to augment the manufacturing capacity of such components and commodities within the country. This would entail firm allotment of foreign exchange on a year-to-year basis, and commitment of targets and funds for electrification programme on at least a ten-year profile, so that the indigenous manufacture could be assured of a sustained offtake and the industry could plan for increased production within the country.

7.5.1. Some important items which require special attention are solid core insulation, power transformers, 132 KV and 25 KV circuit transformers, 25 KV insulation, telecom cables and structural steel sections of the relevant sizes.

7.5.2. The requirement of copper, zinc and aluminium for the electrification programme should be taken into account in the National Plans.

7.6. The present methods and procedures are time-consuming and tortuous and has an inbuilt mechanism to cause delays. In this connection, the Committee would make a number of suggestions.

7.6.1. For electrification projects, the bulk of the procurement should be decentralised and delegated to the Regional Manager of project zones. The regional officer in charge should be able to finalise everything about tendering at his own level, or at the level of the individual project officer, depending upon the value of the tender.

7.6.2. Proper estimation of requirements for a project has to be based on a foot-by-foot survey and this, therefore, needs to be undertaken sufficiently in advance in respect of specific projects on a continual basis, once the projects have been included in a Five Year Plan for implementation. To expedite the progress of such surveys, a multi-pronged approach should be undertaken during the next three Five Year Plans, under which these surveys should be conducted not only by the electrification project organisations, but to speed up this work should also be contracted out to RITES and IRCON, and given even to zonal Railways, if necessary.

7.6.3. The success of the programme would require a wide delegation of powers to the authorities in the centralised set-up and in the field for speedy execution and economising on time and effort. This should include, inter alia, the facility of executing contracts to known and tried firms for specific jobs, after appropriate scrutiny.

7.6.4. To accelerate the pace of implementation, particularly in respect of the execution of OHE-equipment works, an appropriate arrangement needs to be made for traffic blocks. It will not be possible for freight throughput to be regulated without adverse consequences to the Railway's commitment to the economy. As the work would have to be carried out more or less 'under traffic' during the period OHE work is undertaken, the Committee would suggest the adoption of a number of measures.

7.6.4.1. To enable full use being made of the traffic blocks, the project organisation should be given the use of diesel shunters instead of steam. This would also be in the interest of the movement of traffic.

7.6.4.2. Hydraulically operated platforms on EMT's (electrical material trains) should be adopted on the trains to save time in operation and to avoid disturbance to foundation materials as also the total time taken 'on line' by the materials trains.

7.6.4.3. Diesel operated cranes should be used in lieu of steam operated cranes, wherever possible, for busy routes in order to avoid loss in time and to reduce the requirement of traffic blocks.

7.6.4.4. Modern wiring trains which can reduce the time taken in stringing of OHE should be used first on the intensive routes, particularly on the quadrilateral and the diagonals. A few such machines should be urgently imported. Meanwhile, the requirement of such machines on a perspective basis should be assessed and their indigenous production organised.

## 8.0. A change in strategy.

8.1. The objective of the electrification effort on the Railways has been conceived and executed as a cost-reduction effort. In the Western countries, the electrification effort has been combined with other measures as a capacity-boosting effort, and has resulted in increased throughput at a faster pace. This effort in

\* The Committee would elaborate on this further while discussing the structural changes in the Board in a subsequent report.



India has so far been conceived in a fragmented manner as routewise electrification projects have not been sanctioned. The basis idea of electric traction, enabling uninterrupted haulage of heavier trailing loads over very long distances, has been side-tracked in actual practice, which has necessitated change of traction on artificial boundaries leading to terminal detentions, wastage of crews and poor speeds. In the overall analysis, it is evident that the optimum advantage of electrification has not been derived.

8.2. The fact that electrification effort has not resulted in any increase in speeds of the goods trains or in the utilisation of locos in a consistent manner is evident from Tables 8.2 and 8.3.

Table 8.2

## Average speed of goods trains (Kms./Hour)

## Broad Gauge

Year	Diesel	Electric
1950-51	..	20.8
1955-56	13.9	19.8
1960-61	22.2	19.5
1965-66	23.7	23.4
1968-69	22.9	25.5
1973-74	22.2	22.5
1976-77	23.1	25.2
1977-78	22.2	24.7
1978-79	21.5	23.9
1979-80	21.1	23.4
1980-81	21.3	22.8

Table 8.3

## Engine Kms. per day per engine in use (BG)

Year	Passenger		Goods	
	Diesel	Electric	Diesel	Electric
1950-51	..	397	..	191
1955-56	..	368	87	206
1960-61	250	363	300	156
1965-66	449	331	353	327
1968-69	658	379	361	349
1973-74	694	408	307	272
1976-77	721	697	379	445
1977-78	748	684	353	406
1978-79	628	459	317	309
1979-80	630	452	307	289
1980-81	610	453	303	274

8.2.1. The comparison indicates that there is not much to choose between diesel and electrics on the basis of the results obtained so far. The Committee, are, therefore, suggesting a change in the outlook so that optimum benefits can be derived.

8.3. Intrinsic advantages of electric traction have not been fully exploited possibly also due to the following constraints :

1. Limitation on the speed of wagons, specially four-wheelers.
2. Limitation on trailing loads not exceeding 3600 tonnes because of loop lengths.
3. Non-availability of electric locos with high adhesion and horse power.

8.4. In the opinion of the Committee, the emergence of new design of wagons (BOX 'N' has been conceived)\* which should permit haulage of 4,500 tonnes within the existing loop length is the first major step expected to yield dividends on electrified territories in the coming years. These wagons are being equipped with air brakes, and with these it should be possible to attain higher speeds. The target set for 2000 AD is to haul an originating tonnage of 500 to 600 million tonnes, and to produce a total transport freight output of about 400 billion net tonne kms. This task requires deployment of sophisticated technology and modern concepts. The growth of traffic on the quadrilateral and diagonal routes has been phenomenal and it is expected that the share of these routes in terms of billion net tonne kms. might be of the order indicated in Table 8.4.

Table 8.4

## Growth of traffic

Year	Total estimated Share of the quad-rilateral & diagonal (billion NTKMs)			
	Lower†	Upper†	Lower	Upper
1989-1990	271	298	190	209
1999-2000	375	413	300	330

## 9.0. Future perspective.

9.1. The following strategy of growth is recommended.

1. Haulage of increased trailing loads initially of 4,500 tonnes and increasing upto 7,500 tonnes and possibly beyond in stages and depending upon the requirement.
2. Dedicated fleet of wagons for certain major bulk streams of freight traffic.
3. Automatic signalling to permit fuller capacity utilisation on congested routes which will help to reduce additional trackage.
4. Development of adequate terminal facilities and nodal points in a big manner to cover the bulk of traffic and the rake users.

9.2. The present design of electric locomotives require the following number to haul 4500 tonne trains under

\* The Committee have suggested changes in this design. What is important here is the fact that the wagon design should permit maximum exploitation of load in relation to track standards.

† The lower figure is the need-based requirement. The upper figure is calculated by adding to the need-based requirement a 10 percent for resilience.



varying conditions :

Trailing tonnes	Grade	Speeds	No. of electric locos of existing designs required
4,500 T	1 in 400	90 KMPH	2
4,500 T	1 in 200	65 KMPH	3
4,500 T	1 in 100	60 KMPH	4

9.3. In future even higher loads are to be carried and it is, therefore, essential that a proper design of locomotives is evolved. The present designs are outmoded and the technology considerably behind the current developments. The major weakness is poor adhesion which can be considerably improved by the incorporation of thyristors/choppers. The modern generation of electric locomotives are capable of hauling the same loads with less number of axles and higher reliability. In this context, the Railways should both uprate and update their designs, and develop locomotives which would incorporate advances in technology that have taken place in the world in the last ten to fifteen years.

9.4. It may be necessary to import a few designs and prototypes in the beginning rather than under-take (prolonged and expensive) research effort at this stage to develop a new design for an electric loco. However, as the imported designs or prototypes may not be ideally suited to Indian conditions, they would require to be adapted after extensive field trials. The Committee suggest this expedient to cut out time and delay.

9.5. The need for replacing steam shunting engines on electrified routes is evident. The question arises as to whether the replacement should be arranged by an electric shunter, a diesel shunter, or an electric shunter also powered by batteries. The third expedient will have the advantage that on electrified lines the shunter can draw juice from the OHE, while on non-OHE yard-lines, from the batteries. The Railways should explore this.

9.6. Modern technology would also permit remote control in locomotives, which is a desirable operational feature.

9.7. The limitation of axle load imposes constraints on the tractive effort which gets restrained on account of adhesion deficiency. Designing of electric locomotives should take into account the growth requirements of the system and the possibility for adopting for higher axle loads.

9.8. Electric traction would be eminently suitable for high speed passenger trains with heavier trailing loads under Indian conditions. In India, however, high speed passenger trains on the Rajdhani pattern can only be justified on special sectoral considerations. The need today is really for passenger trains with 22 coaches or more booked at 110 Kmph to meet the burgeoning demand of passenger traffic. Later beyond 2000 AD even higher speeds of upto 160 kmph could be considered. The HP requirements of a 22 coach train running at 160 kmph would be of the order of 6000 HP, which a single diesel loco even of modern design does not provide. Electric locos with this power rating are quite common, and one single loco can handle such trains and also provide 'hotel load' for air-conditioning, heating, lighting etc. from the loco itself. There is, therefore, need to develop passenger locos separately from freight locos to achieve optimisation.

9.9. In certain commuter sections, the need to introduce Electric Train Sets (ETS) should be explored. In such a system, coaches are provided with traction motors and driving cabs at the two ends. Such trains have high acceleration owing to availability of motor coaches and do not need universal of motive power. These are slightly different from the existing suburban trains (Electrical Multiple Units), where only one out of the three coaches are powered. Further, while the EMUs do not have any toilet facilities, as essentially designed for short distance traffic, the Electric Train Sets would have to have a changed design with such facilities as it would cater to medium distances and facilitate people going in the morning and returning in the evening. The routes on which such sets can be run can be Kanpur-Lucknow, Delhi-Agra, Lucknow-Bareilly, Howrah-Asansol, etc. The Committee recommend that two pilot projects may be taken up early so as to assess the results.

#### 10.0. Personnel.

10.1. The electrical engineering department is an expanding department. It is also a department in which technology is changing fast. It cannot be worked on the basis of the conventional system of recruitment. Being highly sophisticated and as the turn-over is becoming very fast, because people are leaving for better jobs, there has to be a continuous lateral induction, especially for developments in electronics.

10.2. The Committee would, therefore, make a number of recommendations.

10.2.1. In future recruitment of officers in Electrical Engineering, both electrical and electronics backgrounds should be adequately represented.

10.2.2. Steps should be taken for the establishment of a central training institute for electric traction and allied subjects either at Hyderabad/Secunderabad or at Bangalore, where all the major institutes dealing with Electronics like BEL, HAL, ECIL, NGEF are located and others are coming up. Properly qualified Professors and Instructors should be recruited from the Railways as also from outside. They should be specialists in their respective spheres. It would also be worth-while to empanel competent and qualified visiting Professors.

10.2.3. Lateral recruitment in higher supervisory grades should also be thought from persons with minimum qualification of a Degree in Electrical/Electronics Engineering.\*

#### 11.0. Power tariffs.

11.1. The Railways require power supply at 25 KV on a single phase basis. This supply is arranged from the State Electricity Boards. The existing tariff structure, however, suffers from several lacunae, both in the concept of its formulation and in the manner of its execution. The Committee consider that some rationalisation is required in the tariff structure made applicable for the Railways by the various State Electricity Boards to bring it on a sound basis.

11.2. However, as this issue impinges on the finances of the Railways, the Committee propose to deal with it later in the Part dealing with Resource Mobilisation. At this stage, the Committee are only highlighting the fact that the existing tariff-structure requires serious re-examination.

\*Other relevant and ancillary issues will be discussed in a later Part on Personnel.



## 12.0. Conclusions.

12.1. In keeping with the dictates of the energy situation, the pace of electrification requires substantial acceleration. Priority should be given to the quadri-lateral, diagonals and a few other highdensity routes.

12.2. The Railways should guard against any slippage in the programme of electrification in the Sixth and Seventh Plans and in Plans thereafter.

12.3. In order to derive full benefits of electrification planning should be in respect of routes rather than sections.

12.4. In order to sustain the electrification-effort at levels anticipated for the coming years it is considered necessary that requisite resources are earmarked in terms of a five-year programme. It will also be necessary to place the work under a very Senior Executive in the Railway Board and also again at the zonal levels. Modern methods of wiring, use of diesel-operated cranes and hydraulically-operated platforms should be adopted, along with the use of other modern technological devices.

12.5. The electrification effort should in future be also conceived as a package for systems improvement of the rail network, wherever it is taken up. This would necessitate a simultaneous development of modern and usefull designs of rolling stock.

12.6. In this context a few designs and prototype-of the latest generation of electric locomotives should be imported, so that the Railways can get on with further development from that stage onwards. The imported esgins and prototypes should be tested in the field extensively, and the ones best suited to Indian conditions selected for production.

12.7. Electric train sets should be used as an experiment on a few commuter-like routes.

12.8. A change in the strategy of management and recruitment practices is recommended, keeping in view the requirements of modern technology in electric traction.

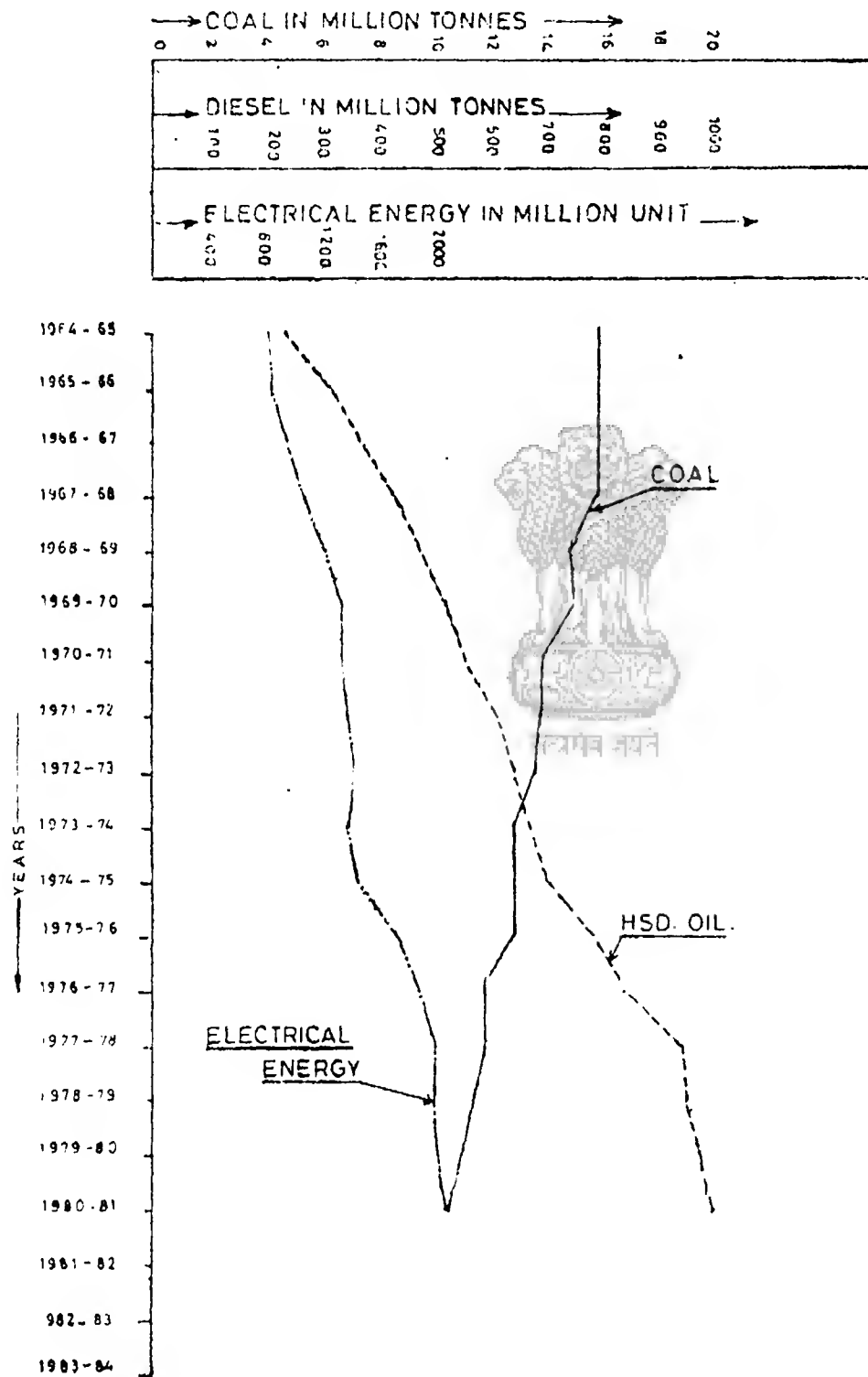
12.9. The existing power tariff structure is neither rational nor scientific and requires to be changed.





## ANNEXURE A.8.1. (C.F4 2)

# FUEL/ENERGY CONSUMPTION OF INDIAN RAILWAYS. INCLUDING ELECTRICAL MULTIPLE UNIT SERVICES. <sup>(ALL GAUGES)</sup>





## ANNEXURE A.8.2

( Cf. para 34, )

## ECONOMICS OF RAILWAY ELECTRIFICATION

## Evaluation of break-even level between diesel and electric traction.

## 1.0. Introduction.

1.1. The break-even level between diesel and electric traction in terms of traffic density, as worked out by the Raj Committee, based on the cost structure at the time of the preparation of the Report is as indicated in Table A.1.

Table A.1

## Electrification : IRR\* and traffic density

	Internal rate of return	Traffic density in M.GTKM/RKM/annum	
		Without CLS**	With CLS
Financial Study	10%	29.5	31.25
Economic Study	12%	28.0	30.35

## 2.0. Sensitivity analysis of the comparative economics.

2.1. A sensitivity analysis of the cost of the inputs carried out by the above committee indicated that the comparative economics is sensitive to the following in the order shown :

- (i) Cost of diesel fuel.
- (ii) Capital cost of electrification.
- (iii) Cost of electricity.
- (iv) Difference in cost between diesel and electric locomotives.
- (v) Cost of repairs and maintenance.

## 3.0. Change in costs.

3.1. Since 1978 when the Raj Committee Report was finalised, costs of various inputs have changed radically. Oil prices have increased considerably. Charts showing the increase in prices of Arabian light oil and whole sale price indices over the years are attached Annexure A. 8.5 & 6 The capital cost of electrification and electricity tariffs has also gone up.

## 4.0. Economic &amp; financial evaluation at present day costs.

4.1. We have had the calculations made on the basis of the Raj Committee Report taking into consideration the present day prices of vital inputs, but based on the methodology of comparative appraisal followed by the Raj Committee.

## 5.0. Electrification project cost.

5.1. In the Raj Committee Report the average estimated cost of electrifying a typical double line

section was taken as Rs. 4.30 lakhs/TKM based on the prices prevailing in February/March, 1978. This cost included the cost of colour light signalling works with some accepted economy measures. Since then, due to hike in oil prices in the international market and general inflation in the country, there has been steep increase in the cost of all inputs.

5.2. Table A.2 gives the comparative cost of some items as adopted in the Report and as they exist today :

Table A.2

## A comparison of costs

Description	Unit	Prices as taken in the Report	Present day prices
Copper	Tonne	23,750	32,300
Steel	.. Tonne	1,600	4,935
Zinc	.. Tonne	11,000	26,309
Telecom. cable	.. Km.	47,500	1,00,000
Solid core insulator	.. Each	140	454
12.5. MVA 132 KV power transformer.	Each	10,00,000	14,00,000

5.2.1. As a result of increases in the the cost of materials and labour the average cost of typical double line section now works out to Rs. 7.77 lakhs/TKM. The revised cost of the electrification project works out to 180% of the cost (Rs. 4.3 lakhs per track km.) adopted in the Report.

## 6.0. Cost of locomotives.

6.1. The cost of production of diesel and electric locomotives has been estimated at Rs. 62.00 lakhs and Rs. 52.00 lakhs respectively during 1980-81. (Current costs for an electric loco are Rs. 68 lakhs and for diesel Rs. 70 lakhs).

## 7.0. Cost of electricity and HSD oil.

7.1. The average cost of electricity for traction works out to 40 paise per kwh. The cost of HSD oil works out to Rs. 3,102/- per kilo litre. The cost of lubricating oil comes to Rs. 11,310 per kilo litre. The details of cost of HSD oil and lubricant are given in Annexure A.8.3.

## 8.0. Cost norms for calculations.

8.1. The cost norms adopted for making the discounted cash flow calculation are given in Annexure A.8.4. For economic costing the prices have been taken net of taxes and duties. India having a large measure of unemployed population, labour has been shadow-priced at 60% of its cost, while the foreign exchange has been shadow priced at rates of 15% and 25% for purpose of calculations.

\* IRR—Refer to footnote against para 5.5 of this Chapter.

\* CLS stands for Colour Light Signalling. This signalling is

usually being provided alongwith electrification to save cost on subsequent relaying of underground cables.



## 9.0. Break-even levels.

9.1. The break-even level between diesel and electric traction calculated on the basis of above norms is indicated in Table A.3.

Table A.3

## Break-even levels of updated norms

(Figures in million GTKM per RKM/annum)

	As per report		As per present calculation	
	Incl. cost of CLS	Excl. cost of CLS	Incl. cost of CLS	Excl. cost of CLS
Financial Cost at 10% IRR	31.25	29.5	19.47	18.57
Economic cost at 12% IRR—				
(a) without premium on foreign exchange.	N.A.	N.A.	16.07	15.09
(b) with 15% premium on foreign exchange.	30.25	28	14.01	13.09
(c) with 25% premium on foreign exchange.	N.A.	N.A.	12.86	12.03

## 10.0. Sensitivity analysis.

10.1. A sensitivity analysis was carried out for the following alternatives :

Alternative I: With 10% increase in the cost of fixed installation, other parameters kept constant.

Alternative II: With 20% increase in the cost of fuel/energy.

Alternative III: With 20% increase in the cost of fuel/energy and 10% increase in the cost of fixed installations.

10.1.1. The results indicating the break-even levels of traffic for various internal rates of return are summarised in Table A.4.

Table A.4

## Break-even levels for different IRRs

Internal rate of return in (percent)	Traffic density in million GTKM/RKM/annum			
	At basic cost	Alternative I	Alternative II	Alternative III
10	18.57	20.01	16.16	17.61
12	21.39	23.35	18.91	20.64
15	26.49	28.96	23.53	25.73
20	34.69	38.00	31.16	34.13

ANNEXURE A-8.3  
(Cf. para 7.1)

## (1) Cost of H.S.D. Oil.

Description	Financial cost per kilo litre		
	Without premium of Foreign exchange	With 15% premium on Foreign exchange	
	Rs.	Rs.	Rs.
(i) Basic cost at main installation at Barauni.	2,669.02	2,912.16	3,348.98
(ii) Central Sales Tax at 4%	107.56	...	...
(iii) Freight incl. siding charges at 1%	268.90	81.00	81.00
(iv) DGS & D commission at 10%	26.89	...	...
(v) Handling charges	10.00	10.00	10.00
	3,102.37	3,003.16	3,439.98
Say	3,102.00	3,003.00	3,440.00

## (2) Cost of Lubrication Oil.—

(i) Basic rate FOR Bombay	10,600.00	7,644.00	...
(ii) Central Sales Tax at 4%	424.00	...	...
(iii) Freight including siding charges at 1.6%	169.60	122.30	...
(iv) DGS & D commission at 1%	106.00	...	...
Handling charges	10.00	10.00	...
	11,309.60	7,776.30	...
Say	11,310.00	7,776.00	...

ANNEXURE A-8.4  
(Cf. para 8)

## Comparative Statement showing norms as adopted in Raj Committee Report vis-a-vis those adopted in the present study.

S. No.	Items	Unit	Rated			
			As adopted in Raj Committee Report		As adopted in the present study	
			Diesel	Electric	Diesel	Electric
1.	Fuel/Energy consumption Goods	1000 GTKM	3.60 Litres	11.08 Kwh.	3.50 Lites	11.08 Kwh.
	Mail & Express	-do-	4.77 Litres	19.08 Kwh.	4.77 Lites	19.81 Kwh.
	Passenger	-do-	5.52 Litres	25.10 Kwh.	5.52 Litres	25.10 Kwh.
2.	Lubricant consumption		1.83% of HSD oil.	0.73 litres per EKM	1.83% of HSD oil.	0.73 litres per EKM



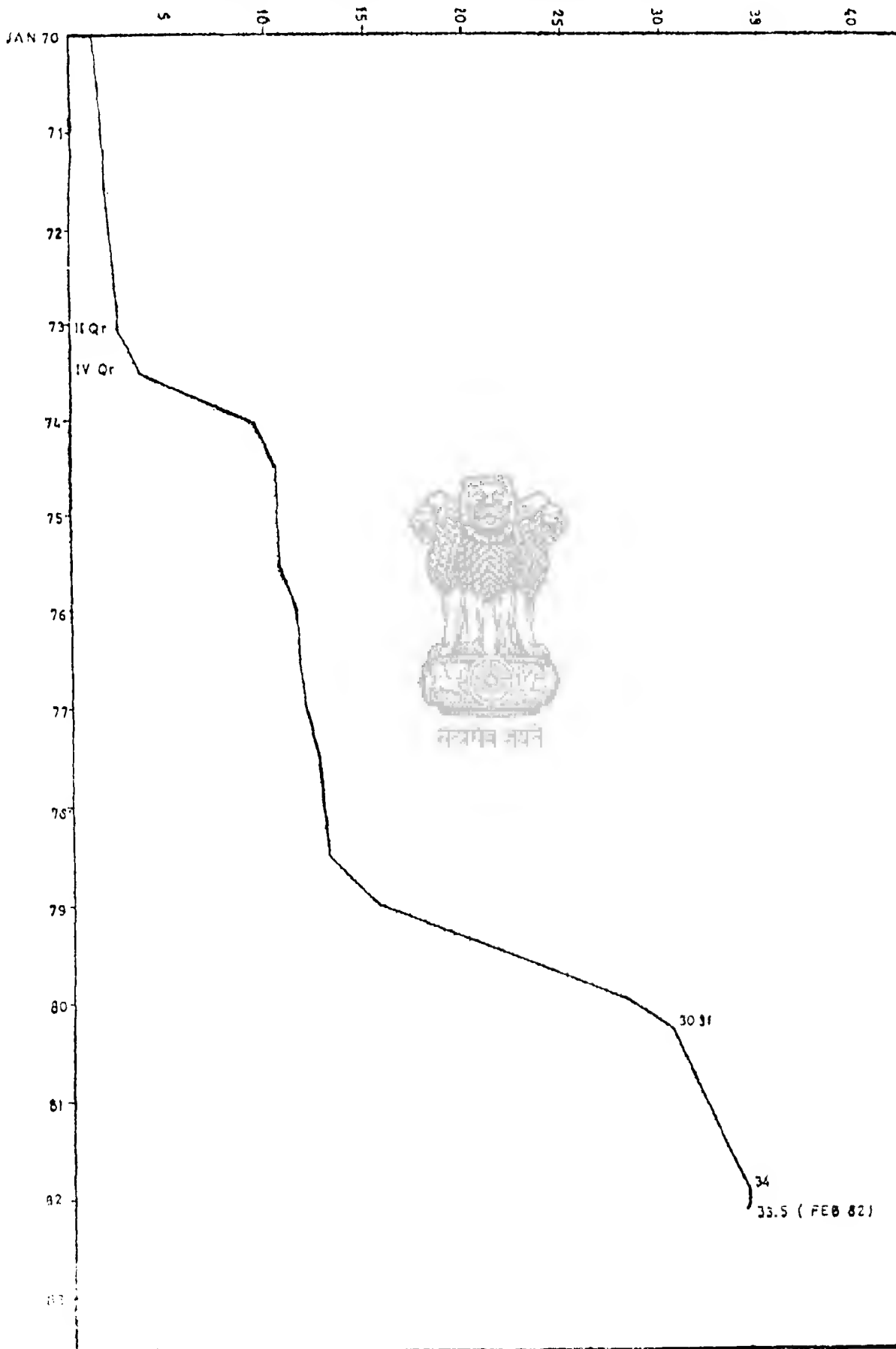
## Financial &amp; economic costs

S. No.	Items	Unit	Financial Cost		Economic cost		With 15 % premium on Foreign Exchange		With 25% premium on foreign exchange in this study
			As per Raj Committee	Updated	Without premium on Foreign Exchange		As per Raj Committee	Updated	
					As per Raj Committee	Updated			
1.	H.S.D. Oil	KL	1292.60	3,102	968	3,003	1,102.70	3,440	3731
2.	Lubricating oil	KL	7899.20	11,310	7,595.38	7,776	7,595.38	7,776	..
3.	Electrical energy.	Kwh.	24 P.	40 P.	20 P.	30 P.	20 P.	30 P.	..
4.	Electric Loco	Each	45 lakhs	53 lakhs	41.55 lakhs	48.01 lakhs	42.02 lakhs	48.56 lakhs	48.73 lakhs
5.	Diesel Loco	Each	42 „	62 „	38.15 „	56.32 „	38.76 „	57.51 „	58.30 „
6.	Power Pack	Each	17.40 „	25.69 „	16.04 „	23.68 „	16.04 „	23.68 „	..
7.	Diesel Loco Shed.	per loco.	3.66 „	6.61 „	2.375 „	4.29 „	2.40 „	4.33 „	4.36 „
8.	Electric Loco shed.	per loco.	3.44 „	6.22 „	..	..	..	..	..
9.	Running Repair of Diesel.	Engine Km.	1.417 „	1.984 „	1.313 „	1.838 „	1.313 „	1.838 „	..
10.	Running repair of Electric loco.	-do-	1.062 „	1.487 „	0.94 „	1.316 „	0.94 „	1.316 „	..
11.	POH of Locomotives :								
	Diesel	Each	3.19 „	5.04 „	2.88 „	4.55 „	2.88 „	2.55 „	..
	Electric	Each	2.26 „	3.57 „	2.07 „	3.27 „	2.07 „	3.27 „	..
12.	R & M of OHE	TKM	3540	4956	2336	3270	2336	3270	..
13.	R & M of S & T	RKM	2092 3856	2929 5398	1381 2545	1934 3563	1381 2545	1934 3563	.. ..
14.	Cost of Electrification.	TKM	4.30	7.77	..	..	..	..	..



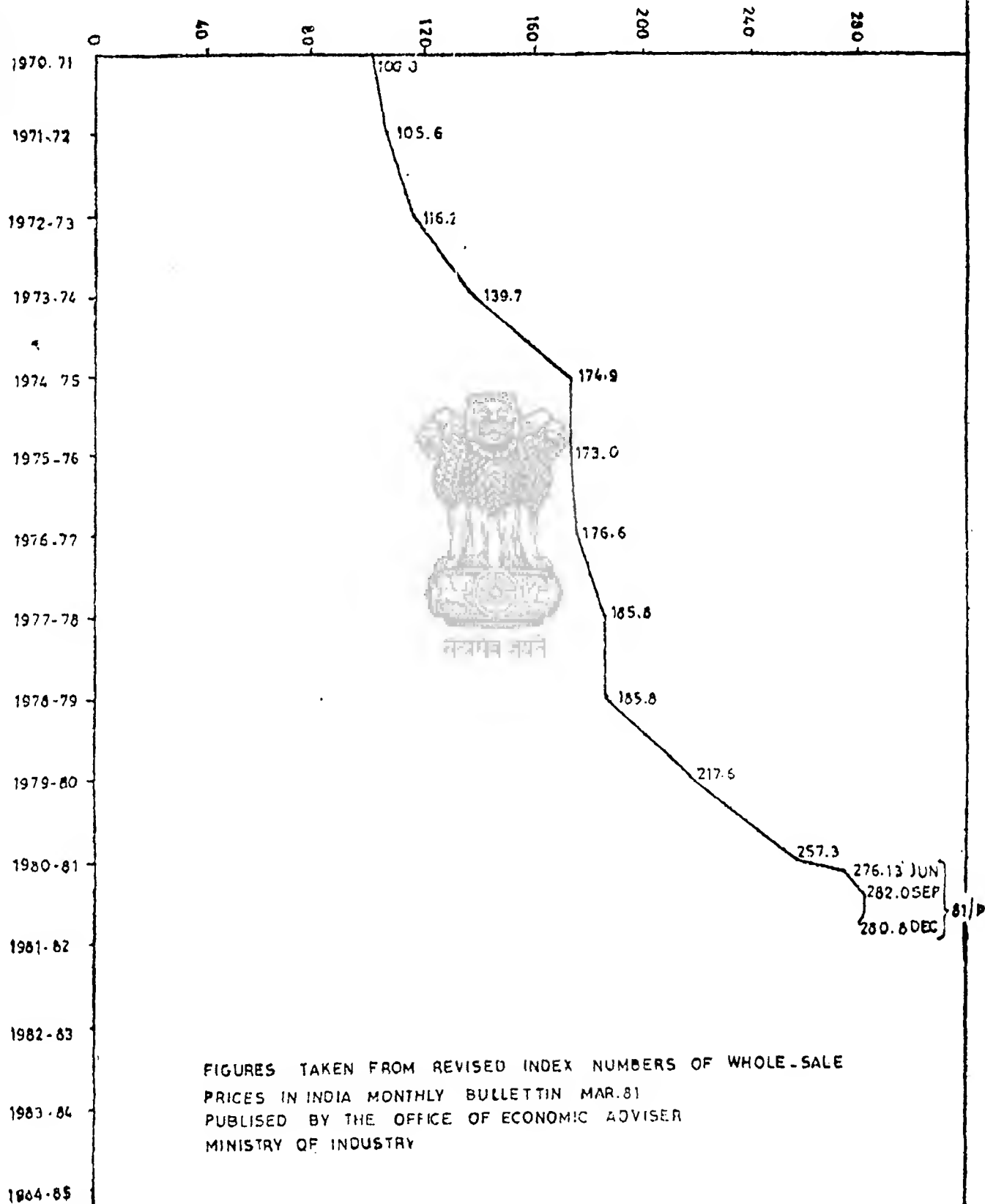
ANNEXURE A B5  
(CF PERA 3.1)

# OFFICIAL PRICE OF ARABIAN LIGHT OIL





# INDEX NUMBERS OF WHOLE SALE-PRICES BASE 1970 71 100





## CHAPTER IX

### SUMMARY OF RECOMMENDATIONS

#### Chapter I

##### Profile of Traffic Growth

1. The figures to be adopted for planning for 2000 AD for the non-suburban passenger traffic should be 280 billion passenger kilometres. For suburban traffic it should be 160 billion passenger kilometres.

(Paras 5.3 and 6.8)

2. The similar figure for railway freight for 2000 AD should be as follows :

Year	Forecast of freight traffic	
	Total tonnes originating in millions	Total tonnes kms. in billions
1999-2000	585.0*	375*
	644.0**	413**

\* These are need-based figures.

\*\* These are need-based figures with a cushion of 10% for resilience.

(Paras 9.5, 10.5 and recommendation 8 below)

3. The Railways have to adopt the concept of moving a rake as the unit of movement especially for bulk commodities to a much larger extent than at present. As a consequence they have to develop facilities at terminal points.

(Paras 8.5 and 8.6)

4. At the same time the Railways have to continue to provide transport for piecemeal traffic in a rationalised, economic and efficient manner, to help in the development of backward areas and small scale industries, and for the carriage of expensive raw materials and finished products.

(Para 8.5)

5. In view of the concentration of both freight and passenger traffic on the quadrilateral and diagonals, these routes would require planned and substantial investments to enable the movement of the fast growing traffic.

(Paras 15.2 and 15.3)

#### Chapter II

##### Transport Planning

6. It is important to generate capacity in the national railway network ahead of the demand.

(Para 6.1.2)

7. The present seasonal peaking pattern in the movement of freight traffic should be evened out to the maximum extent practicable so that, by and large, uniformity in loading round the year can be achieved : this may need stocking up of a part of bulk commodities.

(Para 8.2.2)

8. To impart the necessary resilience to the system, a 10 percent surplus capacity should be generated covering both infrastructure and rolling stock. This would also help towards compliance of the recommendation 6 above.

(Para 8.2.3)

9. The task of moving vastly increased freight and passenger traffic cannot be accomplished without channelisation of sufficient investments into the system from right now, specially as the Sixth Plan is not likely to take the system ahead in terms of capacity. Adequately large outlays during the current and subsequent Seventh and Eighth Five Year Plans will be necessary.

(Para 8.3)

10. NTPC recommended that of the aggregate national generation of transportation for the Railways and other mechanical modes of transport, the Railways should carry 72 per cent of the total. The Committee endorse this recommendation.

(Para 9.2.1)

11. In view of the constraints of resources, the Railways should first complete the on-going new projects rather than take on additional ones specially those of doubtful validity and because of which more urgent projects get delayed.

(Para 12.1.1)

12. Planning for projects must be based on an integrated systems approach and investment decisions should cover all aspects of the system.

(Para 12)

13. The planning process in future must avoid the following major shortcomings :

1. Continuance of mixed traction on dieselised electrified routes. This refers to some trains being permitted to run by steam and/or diesel even on an otherwise electrified route.

2. The progressing of electrification on a sectoral or sectional basis, and 'not on a route basis'. This refers to the manner in which the electrification projects on the trunk routes were conceived, "where even the sanction was issued section-wise", without taking into account the difficulties which were likely to be encountered by change(s) of traction.

3. Failure to change the pattern of examination to suit roller-bearing stock and faster traction. This refers to the modernisation of stock by way of BOX wagons, but not changing the pattern of examination to permit uninterrupted hauls.

4. Failure to segregate, until very recently, the roller bearing stock. Even though BOX wagons were planned to be run as block loads, in actual implementation, these were allowed to be moved piecemeal, cluttering up yards, and leading to coagulation of the fleet.

(Para 12.2)



14. New terminals have to be planned both for freight and passenger traffic. Facilities for mechanising handling have to be developed for full rake loads with designs to cater to the transportation of heavier loads in future.

(Paras 13.1 and 13.2)

15. The development of terminal capacity should be related to the changes in the design of wagons which have to suit bulk commodities. For example, for coal and iron ore the bottom or side discharge design is necessary : such wagons should be introduced for specific power houses or steel plants.

(Para 13.3)

16. To effectively and speedily collect, coordinate and analyse data, the Planning Directorate of the Board must introduce computers.

(Para 14.1)

17. CPLOs should be appointed on the basis of their competence and experience. They must oversee the total Planning effort of the Zonal Railways and ensure that sectoral planning is fully coordinated.

(Paras 15.1 and 15.2)

18. It is necessary to establish small planning cells on all Divisions by re-organisation and adjustment of existing staff, so that grass-root planning is organized scientifically and solutions are discussed and devised in advance.

(Paras 15.4 and 15.5)

19. Each Division should keep certain plans ready for augmentation of route capacity for implementation when the growth of passenger and goods traffic need it.

(Para 15.6)

20. Officers and staff deployed in the planning network should have special aptitude and training.

(Para 15.7)

21. The Works Programme should be rationalised. Projects upto Rs. one crore (which are 96 per cent in number, but only 25 per cent in outlay of the total), may be controlled by General Managers within the overall prescribed budgetary ceilings. This will enable the Railway Board to concentrate on major projects, accounting for 75 per cent of the total outlay.

(Para 16.2)

22. Rehabilitation of worn out assets has to be given a higher priority than construction of additional lines.

(Para 18.5.2)

22.1. A review be undertaken of the existing uneconomic branch lines and some of them closed after suitable alternative arrangement is made.

(Para 18.6)

22.2. Project oriented lines should be accorded the highest priority. To maintain full coordination the investment methodology for such lines should be changed, and the cost should be treated as an integral part of the specific project even though the same will be borne by the Railways. While sanctioning a project the outlay for the new lines should also be sanctioned at the same time.

(Para 19.1.1)

22.3. The second priority should be given to missing links or alternative routes to relieve congestion on existing busy high-density routes. Before taking a decision, the

financial returns of all the alternatives should be studied and normally the cheaper alternative preferred.

(Para 19.1.2)

23. Strategic lines should have their own specific priority depending on their justification.

(Para 19.1.3)

24. The Railways must control unbridled proliferation of uneconomic branch lines.

(Para 19.1.4)

25. All new lines when sanctioned should be allotted adequate resources to ensure their completion within a reasonable time, which in most areas should not exceed 3 to 4 years.

(Para 19.3)

26. Conversion of gauge should not be arranged *ipso facto*, but should be undertaken only for strong reasons particularly so long as the constraint of resources continues.

(Para 20.2)

27. An immediate beginning must be made for undertaking all-round improvement of the metre gauge system, specially relating to track structure, introduction of heavy-duty freight locomotives, introduction of heavier trains and introduction of heavy-duty couplers in respect of freight traffic with new designs of wagons.

(Para 20.4)

28. On the metre gauge introduction of a number of inter-city trains on selected routes where feasible, at speeds of 80 to 100 kmph is recommended.

(Para 20.4)

29. In the short term, increase in the trailing loads of the MG freight trains, enhancement of loop capacities, provision of line capacity works including patch-doubling on saturated metre gauge routes should be taken up

(Para 20.4.)

30. The Committee generally support the conclusions of the Committee on Metre Gauge Operations, (submitted in May, 1979) and recommend them for adoption.

(Para 20.4)

31. The transshipment problems on the M.G. should be solved by a two-pronged strategy : (a) for commodities such as coal, transshipment should be arranged through dumps and not on a straight method as is being done now, particularly for heavy streams ; (b) containerisation of heavy flows of general goods should be undertaken with the use of appropriate mechanical aids at transshipment points.

(Para 20.5)

32. The Railways have made no plans for modernisation of transshipment points. The Committee recommend that this should be started as a pilot project by selecting two transshipment points in different regions, for which provision already exists in the Works Programme.

(Para 20.5.1)

33. There is hardly any scope for taking up new schemes on the M.G. for conversion in the near future. All conversion projects other than those so indicated and dictated entirely by the need of high traffic or high priority consideration e.g., the North East, be frozen, and resources diverted for improving the metre gauge systems.

(Para 20.7)



34. Narrow gauge sections, which are initially catering to the needs of passenger traffic should be closed by suitable development of road transport in a phased manner, excepting hill sections and the Central India system. For the latter, gauge conversion is not recommended.

(Paras 21.8 and 21.9)

### Chapter III

#### Passenger Transport

35. Passenger transport deserves higher consideration than has been extended to it in the past, so that the future needs can be efficiently met.

(Para 1.2)

36. A correct appreciation of the principles of inter-modal split should govern the Railway's policy on passenger traffic.

(Para 3.1 to 3.3)

37. No further proliferation of any sectional stopping passenger trains should be allowed except for the strongest possible reasons.

(Para 5.4.1)

38. The existing stopping sectional passenger services should be scaled down on the quadrilateral and diagonal routes as feasible, so that eventually only one pair of up and down services remains.

(Para 5.4.2)

39. In the first phase, the sections for reduction to be chosen should be those, where the maximum number of stopping sectional passenger trains are being run. Withdrawal of these trains should also be in stages.

(Para 5.4.3)

40. Even for one up and one down services, which are recommended to be run, stoppages should be rationalised and at some stations, alternate-day services may be provided, stopping at alternate stations, so that no single station is deprived of a service at least on three days a week.

(Para 5.4.4)

41. Coordinated services should be developed on the road by the concerned authorities.

(Para 5.4.5)

42. The released capacity be used to run inter-city medium and long distance passenger services and speedier transport of freight throughput.

(Para 5.4.6)

43. Suburban-like traffic presently being catered to by stopping passenger services has to be met by running commuter services with electric/diesel-hauled long corridor trains, EMUs, or Electric Train Sets, and not by slow stopping passenger services. Appropriate arrangements may be initiated.

(Paras 5.7 and 5.8)

44. Maximum emphasis should be paid on the optimisation of the trailing load for long and medium distance inter-city trains.

(Para 7.1)

45. For efficiency and convenience of passengers the replacement and augmentation programme should be speeded up, and during the remaining years of the Sixth Plan and during the Seventh Plan, the trailing load

should be maximised of the largest possible number of medium and long distance passenger trains.

(Para 7.5)

46. It is also necessary to introduce inter-city services between intermediate stations on a long distance route, in the nature of medium distance trains.

(Para 8.1)

47. On inter-city trains, to meet the demands of passenger travelling from one intermediate station to another, or from one intermediate station to the terminal, adequate quotas or coaches in the train should be provided.

(Para 8.1.1)

48. Stoppages of inter-city trains at intermediate halts should be curtailed after an effective system of passenger information-services has been introduced.

(Para 8.1.2)

49. The Railways should assess by a special study the pairs of points between which inter-city services have to be run; the likely quotas for passengers travelling from intermediate stations to other intermediate stations or to the terminal; and possible reduction in the duration of existing halts.

(Para 8.1.3)

50. The maximum speeds for inter-city travel should for the present continue to be 110 kmph: higher speeds will widen the already existing differential between freight and passenger services, thereby creating capacity problems.

(Paras 9.1 and 9.2)

51. R & D efforts in regard to any specific model section or as part of export endeavours for attaining higher speeds should, however, continue. The existing Rajdhani Express trains which are booked at a higher speed should also not be slowed down, except to the extent required for the optimisation of trailing loads.

(Para 9.3)

52. Medium distance intercity services joining satellite towns with major centres of industrial and commercial activities covering a distance of upto about 300 kms. should be introduced in such a manner that the passengers can perform a round trip during the day.

(Paras 11.1 and 10.2)

53. To cater to India's large potential of tourist traffic, specials should be planned with fixed itineraries and combined with road transport facilities for sight-seeing during the day and travel in comfort during the night.

(Paras 1.2 and 11.3)

54. Holiday specials should be run on parameters similar to the running of long and medium distance inter-city trains. The existing running of such specials requires to be improved.

(Para 11.5)

55. To improve the services on the metre gauge, the following action should be taken :

1. Selective line capacity inputs should be undertaken on heavy routes.
2. Track and rolling stock should be uprated to introduce passenger services at higher speeds on some selected routes.



3. Diesel locomotives to be used on passenger trains should be designed to haul train loads upto 20 coaches at speeds upto 100 kmph.
4. More inter-city trains on the pattern of broad gauge should be introduced.
5. Terminal facilities should be improved in a big way, even by going in for new passenger terminals where necessary. (Para 12)

56. All rake-maintenance links need to be reviewed and revised, so that each rake can cover the maximum possible distance, as one or more trains in the time table. (Para 13.1.2)

57. The time taken for placement, withdrawal, washing, and attention to rakes/coaches greatly reduces the effective availability of the fleet. Therefore, terminal and maintenance planning require changes and improvements. (Para 13.1.3)

58. To improve the position regarding the coaching stock, their production should be arranged as follows :

1. To make the fullest use of the existing capacities of coach production in the country for this Government should arrange additional funds during Sixth and Seventh Plans.
2. To restore the 'space stock' at the metropolitan towns in the first instance, followed by other major terminals on a time-bound programme.
3. To run all or most of the long distance inter-city trains with 22 coaches with double heading, to begin with on the quadrilateral and the diagonals. (Para 14.5)

59. The future production of coaches, in addition to normal SLRs and tourist coaches etc., should provide for the following :

1. Second class day coaches with cushion seats ;
2. Second class sleepers with cushion seats ;
3. A.C. chair cars ;
4. A.C. two-tier sleepers ; and
5. First class A.C. coaches.

(Para 14.6)

60. Double decker coaches, not being suitable to Indian conditions, need not be introduced. (Para 15.4)

61. The composition of trains should be standardised which would also enable development of necessary maintenance facilities and a more efficient maintenance procedure. (Para 14.9)

62. To achieve such standardisation, the Committee recommend that ordinarily the following composition of rakes be adopted :

*For long-distance trains :*

- 13 Non A.C. Sleeper coaches
- 4 A.C. Sleeper coaches
- 1 First class A.C. coach
- 2 SLRs
- 2 Pantry cars

Total 22 coaches

*For medium-distance trains :*

- 11 Non-airconditioned chair cars
- 2 A.C. chair cars
- 2 SLRs
- 1 Pantry car

Total 16 coaches (which can be suitably augmented).

(Para 14.9)

63. A cell should be established in the Directorate of Tourism (Railway Board) for ascertaining passenger reaction on a regular basis. On the design of coaches and other amenities, every six months such reaction-studies should be undertaken by this Directorate. (Paras 15.1 and 15.2)

64. As an immediate first-step measures, the coach designs should be modified to provide for the following amenities :

1. Improving the ratio of toilet to passengers in a coach.
2. Providing increased water storage capacity.
3. Providing cool drinking water during summer by designing and introducing (electrical) water cooling system.

(Para 15.3)

65. With the growth of the metropolitan cities, no effective steps for setting up satellite/new terminals have been taken, and the opportunity of acquiring land for creating such terminals is being progressively lost. This needs to be vigorously pursued.

(Para 16.2)

66. There are already 15 cities where the existing population has crossed half million mark. In such cities land acquisition for new terminals should be taken in hand atleast for planning purposes, while there is still some possibility of getting suitable land.

(Para 16.2.1)

67. Even if the Railways due to shortage of resources cannot acquire all such land forthwith, the State Governments should be persuaded to earmark the required land-area for rail development in their land-use plans.

(Para 16.2.2)

68. There should be provision for cheaper road transport between railway terminals in the metropolitan areas, so that the inconvenience to the passengers is minimised, and transfer from one terminal to the other, or from one mode to the other, is possible within minimum time and cost. This requires effective coordination between the Railways and the metropolitan road transportation organisations. (Para 16.3)

69. One of the greatest bottlenecks is the poor mobility on the platforms because stations, particularly the large ones are cluttered up, with parcels traffic, RMS traffic, a large number of food and vending trollies, book stalls and other miscellaneous items. Cleaning operation of the existing platforms should commence forthwith. While the Railways should explore how best to achieve this, the number of vendors at major stations should be reduced, if necessary, even by increasing static units. (Para 16.4)



69.1. The whole business of parcels movement should be rationalised and passenger platforms cleared.

(Para 16.4)

69.2. Parcels congestion can be tackled in two ways: by arranging booking, delivery and handling in exclusive areas and by earmarking platforms, and by organising inter-city parcel express services to run like mail trains. Both should be attempted.

(Para 17.2)

70. As an immediate measure, super parcels express trains should be commenced on the quadrilateral and the diagonal routes. The experiment should later be extended to other trunk routes.

(Para 17.3)

71. The Railways should also encourage collection and delivery services for parcels, to begin with, in the four metropolitan towns. These arrangements should gradually be extended to other major commercial centres. This job also should be entrusted to the Inland Transport Corporation, (recommended also for wagon-load and smalls traffic in metropolitan and major commercial centres).

(Para 17.4)

72. The whole problem of movement of parcels particularly between major cities and metropolitan areas should be studied in detail, and for this purpose, the Railways should immediately set up a Task Force comprising experienced and knowledgeable experts.

(Para 17.7)

#### Chapter IV

##### Punctuality Performance

73. Stress must be laid on the punctuality of all passenger carrying trains.

(Para 2.9)

74. A train should be considered as 'punctual' if it starts right time, reaches all the scheduled halts starts right time, reaches all the scheduled halts punctually and arrives at the destination on time.

(Para 2.10)

75. The compilation of punctuality statistics should be arranged on the following basis :

1. The practice of trains being considered as 'not losing time' be given up, (except for local appraisal of performance on a Zone or Division.)
2. If a train is late at any point on a division or a zone, it should be treated as being lost for that unit.

(Para 3.1.1)

76. The previous practice of having standby coaches/rakes at the major terminals may be revived. The existing organisational flaw which does not permit the originating stations to know the fate of the coaches detached enroute should be remedied.

(Para 3.1.2.1)

77. The running schedules of passenger carrying trains, as published in the time tables, should be considered sacrosanct.

(Para 3.1.3)

78. Sections where capacity utilisation exceeds 80 per cent should be given priority for enhancement of line capacity.

(Para 3.1.5)

79. Poor maintenance and examination of rolling stock affecting punctuality should be tackled by improving the quality of maintenance in loco sheds and carriage & wagon depots, alongwith improved maintenance practices in Workshops, and their modernisation.

(Para 3.1.7)

80. In metropolitan areas on a long-term basis, to cater to the needs of growing traffic in future, additional sectional capacity must be generated by providing separate tracks for passenger traffic.

(Para 3.1.10)

81. Time-tabling should give up provision of 'slacks' and compute engineering allowances scientifically and correctly. This would help making the time tables more realistic.

(Para 3.1.11)

82. A concerted drive should be arranged by the Railways and the State Governments to effectively catch and punish pulling of alarm chains, disconnecting of hose-pipes, and such other interferences with the running of trains to check this menace.

(Para 3.2)

#### Chapter V

##### Freight Transport

83. The strategies which have brought about an improvement in the freight transport recently such as discarding of inefficient locomotives and ineffective wagons, segregating the express wagon fleet with roller bearing stock from the rest, increased haulage of bulk-commodities, and introduction of end-to-end examination, should be rationalised further and formalised.

(Para 1.5 and 1.6)

84. The four-wheeled wagons is a non-viable unit in today's context. It should be phased out in favour of the eight-wheeled bogie open or covered wagon.

(Para 3.7)

85. The strategy for the coming years would require the Railways to fully exploit their natural advantage for movement of bulk commodities like coal, foodgrains, mineral ores, cement, fertilisers, POL etc. To achieve this, the following steps would require to be taken :

1. Loading being done in block rakes without requiring multiple placements for breaking them.
2. A pattern of examination being adopted which would permit these trains to cover the lead without detentions enroute.
3. For such rakes intermediate yards would cease to have relevance for through movement.
4. Setting up a system of nodal point net work where such block loads would be handled, again without requiring any breakage of the load.

(Paras 4.2 and 4.3)

86. Facilities for loading and unloading block rakes will require to be developed. Such rationalisation in loading and unloading arrangements is essential for optimised movement of throughput, and should not be allowed to be compromised.

(Paras 5.5 and 5.7)



87. The absence of properly equipped terminals for unloading should be overcome by the establishment of nodal points, which should be equipped with the following :

1. Provision of full rake length siding(s), to handle block rake(s) by and large in one placement, with mechanical aids.
2. Adequate storage facilities both in areas of production and distribution ; and
3. Facilities to transport by road to the consuming centres within a radius of 100 to 150 kms.

(Para 5.1)

88. The question of having combined nodal points for handling two or more commodities to economise on the investment should be explored.

(Para 6.2)

89. For handling of coal, the following steps may be taken :

1. Movement in block rakes.
2. Creation of necessary facilities at the existing sidings of power houses, steel, fertilisers and cement plants for quicker handling of rakes.
3. Establishment of coal dumps depending upon the demand either District-wise or in smaller areas as necessary.
4. Establishment of coal dumps at major coal transshipment points, so that the block rakes are immediately unloaded on arrival and quickly revert to the circuit. For doing this, mechanised loading and unloading arrangement would be necessary.
5. The Railways undertaking a guaranteed timely movement of coal upto at least 80 percent of requirement, once the above arrangements have been brought about.

(Para 7.6)

90. For the movement of steel, the number of stock yards need to be increased, and their network has to be developed in consultation with the Railways.

(Para 8.2)

91. The existing stockyards may be provided with full-rake unloading facilities by mechanical means wherever these have so far not been provided.

(Para 8.3)

92. The investment required for the establishment of nodal points should be borne by the concerned party, namely the industry concerned while the Railways should bear the cost for new design of wagons and investment on rolling stock.

(Para 11.2)

93. In view of the economics achieved by movement in block, rakes, the Railways should offer concessional freight for bulk transport in train-loads, as incentive for systematisation of this rationalisation.

(Para 11.2)

94. To spearhead the establishment of nodal points, the following plan of action is recommended :

1. Establishment of a Task Force for identification

tion of nodal points for fertilisers, cement and foodgrains.

2. Establishment of a Group of Experts comprising representatives of the Ministries of Railways and Steel to indicate a time bound programme for the development of additional stock-yards and of requisite facilities in the existing stock yards.
3. Allocation of sufficient funds so that the scheme takes off and becomes a success.

(Para 11.3)

95. The pattern of examination may be related to the objective of moving wagons over longer distances without undergoing dilatory midway checks, be it by way of handling in a yard, or any other type of examination.

(Para 12.2)

96. The following action should be taken expeditiously :

1. A system of maintenance; which would permit a movement-pattern, allowing the wagons in a rake to roll over distances of 1,000 Kms. without requiring any examination, upto 2,000 Kms. with only one vacuum-upgradation and beyond 2,000. Kms. with two upgradations.
2. Creation of requisite facilities at the terminals for examination.
3. Development of wagon designs which will promote such movement-patterns and such train-examination systems.

(Para 12.4)

97. The question of rationalisation in the number and scope of small and intermediate yards should be taken up for a detailed scrutiny.

(Para 13.3)

98. It should not be necessary to work some of the intermediate yards round the clock. It should also be possible to close down some of these yards in part or full.

(Para 13.4)

99. Exchange yards are neither a least-cost solution nor helpful to the Railways or the Industry, and, therefore, the following plan of action is suggested in respect of yards serving the major points :

1. Abolition of exchange yards in stages, where they already exist, for all operational purposes.
2. Adoption of a policy that in future the exchange yard will give place to a peripheral yard, as indicated in 3 below.
3. Creation of a peripheral yard, for all rail-borne inward and outward movements, as close to the logical end of the activity as possible within or around the premises of the user.
4. Equipping the peripheral yard with complete facilities of receiving cum-despatch lines and examination of rolling stock.
5. Gradually extending the system to major Plants in the private and joint sector, as this would be in the interest of all round economy.

(Para 12.4)



100. While the above is a conceptual delineation, precise modalities of implementation would have to be decided by the Railways in consultation with the Steel Plants.

(Para 14.10)

101. While the Railways shall do justice to the 85 per cent of the traffic moving in train-loads, and meet such demands fully, they must at the same time cater to the remaining 15 per cent traffic (wagons and smalls) piecemeal, equally efficiently.

(Para 15.3)

102. The Railways should themselves undertake the responsibility for ensuring, to the extent practicable, the movement of such piecemeal traffic in rake-loads over the longest possible distances between two 'focal yards' by adopting the following measures :

1. Rationalisation at the loading stations by arranging such loading on specified days for a particular stream of direction.
2. Organising loading at selected stations of a section in a manner so as to achieve a rake-load formation for a specified number of stations on one particular section of two adjacent sections served by a focal yard. The idea is to expedite movement between the focal yards in a through the rake.

(Para 15.4)

103. The rationalisation of 'smalls' traffic could be done by adopting the following measures :

1. Specifying selected stations where the facility for hooking of smalls would be made available.
2. Loading on nominated days so that the Railways can 'club' such traffic and from wagon-loads, and sometimes even rake loads, in a focal yard.
3. Linkage of hooking of such traffic with collection and delivery services or freight-forwarding services at the metropolitan and major commercial points, so that while the facility of booking at 'smalls rate' is not denied, the Railways can club expediting their movement.

4. Linkage of such traffic on container-borne movement on as many routes as possible from the metropolitan and major commercial centres.

(Para 16.1)

104. While ensuring that movement of 'genuine smalls' takes place, commodities which can and should move in wagon-load, or rake load may not be allowed to escape in 'smalls' particularly in the case of bulk commodities like coal.

(Para 16.3)

105. An Inland Transport Corporation should be set up to look after organised collection, movement and delivery of wagon-load and smalls traffic, to begin with from the metropolitan and important commercial centres. (This Corporation can also look after parcels movement from these centres).

(Para 16.4)

106. The Railways should not move their 'own traffic' in 'smalls' and piecemeal wagons for short-lead movements in congested and metropolitan areas. This will ensure that they practise what they preach.

(Para 16.4.1)

107. To ensure the optimum utilisation of line capacity of a section and faster throughput, freight trains should increasingly run on scheduled time-tabled paths.

(Para 17.9)

108. To improve the effective functioning of marshalling yards, all the staff of various disciplines working in the yard complex, should be placed under the overall command-control of one authority by upgrading the post of Chief Yard Master to that of an Assistant Officer; this can be arranged by adjustment of matching surrender without creation of a new higher post. This must be arranged by the Railways forthwith.

(Paras 17.12.1 and 18.5)

109. Modernisation of a yard in half-hearted or sectoral manner does not yield optimum benefit and may sometimes be even counter productive. The Railways may take in hand 'complete modernisation' of a few key and vital yards as pilot projects, and progress further after some experience.

(Para 17.12.2)

110. The lighting of yards is inadequate and requires substantial improvement.

(Para 17.12.3)

111. Steps should be taken by the Railways to ensure that staff shortages do not effect the efficient functioning of yards, and that a proper environment for output is created.

(Para 17.12.4)

112. For effective coordination, Chief Controller in all major Control Officers should be in command of the Control-complex. For this purpose, he should be an Assistant Officer, and this might be arranged in the same way as suggested in the case of Chief Yard Masters.

(Para 18.3)

113. The practice of reservation in promotion should not be applied to 'Control' and 'yard' categories which are related to safety of operation.

(Para 18.4)

114. Speeds should be calculated on origin destination basis, and should be inclusive of all detentions in the yard and enroute. This should be done on an all India basis, as also zone-wise.

(Paras 19.1 and 19.2)

115. The running-duty allowances should be reviewed to have an inbuilt incentive for efficient running and inbuilt disincentive for dilatory running.

(Para 19.3)

## CHAPTER VI

### International Freight Containerisation and Port Trust Railways

116. In view of our long coast line, and the heavy commitment on the Railways, development of coastal shipping to carry bulk commodities, where ever it is economical or rational is recommended.

(Para 1.4)

117. Adoption of a conscious policy of earmarking definite quantities of cargo, particularly coal and salt, with specific directions to public sector undertakings to fully use coastal shipping, is also recommended.

(Para 1.5)



118. In this context, the possibility should be explored for carrying foodgrains from the North (and later even from Gujrat via Kandla) to down South by ships, even if it may require marginal freight-subsidisation. (Para 2.8)

119. The Railways may energetically emerge into the ISO container resource, by accelerating establishment of inland container depots, and commissioning the requisite number of ISO containers and container flats. (Para 3.1. to 3.15)

120. In order to give a fillip to containerisation, a Container Corporation should be set up immediately. This Corporation will sponsor, plan and execute various inland and international containerisation projects. (Para 4.5)

121. The possibility of the Railways running charter trains by the Shipping Corporation of India on a land-bridge concept should be seriously explored. (Para 4.1 and 4.4.1.)

122. The working of the Port Trust Railways needs to be rationalised for optimisation of performance. (Para 5.7)

123. Dismantling of largely unused facilities in the Port Trust Railway System and their realistic usage are called for, be detailed studies of each such network. (Para 5.8)

124. The major Port Trust Railways of Bombay, Calcutta, Madras, Visakhapatnam, Haldia and Kandla should be merged with the adjacent zonal Railway. (Para 5.11)

125. The logistics of merger need to be carefully evolved and considered by a joint inter-ministerial Task Force, comprising representatives from the Ministries of Railways, Shipping & Transport, and the Planning Commission. Chairmen of a few of the major Port Trusts and the General Managers of the concerned Railways should be co-opted on the Task Force. (Para 5.14)

126. During the interregnum, practice of interchange of traffic between the Port Trust Railways and the mainland Railways should be given up, and the mainland trains should run through, over the port system, to and from the points of loading/unloading. (Para 5.15)

127. The Port Trust Railways should be managed even during the interim period prior to the merger by inducting suitable officers of proven merit from the mainland Railways, taken on deputation on specific tenures. (Para 5.16)

## Chapter VII

### Traction Policy

128. Steam traction may be phased out on an accelerated time-bound programme. Total phasing out of steam will bring a net saving of about Rs. 200 crores per year. (Paras 3.3 and 4.1)

129. The following action plan for accelerated phasing is recommended :

1. Withdrawal of non-IRS locomotives on a specified time schedule from both broad and metre gauge.

2. Conversion of all high-density sections, as specified for this purpose, both on broad and metre gauges to diesel/electric traction on a time-bound schedule for which specific recommendations have been made.

3. The next priority should go to shunting, departmental and work train services on the same routes, in preference to through goods and passenger services on routes with smaller traffic density. (Para 4.4)

130. Even though from the viewpoint of logistics, phasing out steam on MG is easier, priority should be given to heavy-density B.G. routes, to meet the requirements of traffic, and the scheme has to orient itself to the perspective programme of electrification as recommended. (Paras 4.5 and 4.6)

131. To ensure a smooth transition, and depending upon the phases of electrification and manufacture of electric locos, the production of broad gauge diesels should be discontinued by 1986-87. (Para 4.9)

132. Existing production capacity of diesel/electric locos is inadequate and the following manufacturing plan is recommended which also takes into account the growth of traffic in the coming years :

1. Raising of capacity at CLW from the present 66 to the maximum possible. The Railways can make this assessment, and to cover the requirement, beyond this limit, a new electric locomotive factory would have to be set up.
2. Raising the capacity of DLW only marginally, to cater also to the needs of non Railway users, and to accommodate the increasing requirement of power packs.
3. Elimination of the production of BG diesel shunters and low horse-power and narrow gauge shunters from CLW. Such procurement can be made from non-Railway sectors, which, if necessary, can be expanded. Engines, if necessary, may be supplied by the Railways. (Para 4.10)

133. While constant reviews will be necessary to readjust the long-term plans, it should be possible to totally phase out steam from the high-density routes by 1989-90, and from the entire system by 1995-96. A faster phase out is possible if efficiency parameters are improved as recommended by the Committee. (Paras 4.8 and 4.13)

134. A corporate production plan, on parameters indicated by the Committee, should be immediately drawn up to ensure that there is no shortfall on locomotives for handling additional traffic in the coming years, and for simultaneously phasing out steam as quickly as possible. (Para 4.13.1)

135. Electric Train Sets should be developed and experimented with, for being run on some high-density passenger sections as a pilot project, before taking this up for other routes. (Para 5.3)



136. The design of metre gauge diesel loco requires to be changed to derive maximum advantage over standard metre gauge loops.

(Para 5.4)

137. Possibility of designing BG branch line diesels with axle loads of about 15 tonnes should be explored.

(Para 5.6)

138. Shunting engines of adequate horse power should be developed. The possibility of doing so outside the Railway sector may be explored.

(Para 5.7)

## CHAPTER VIII

### Railway Electrification

139. The future inter-modal mix should favour the modes using electric power because this form of energy in the long run can be obtained more easily than diesel.

(Para 1.5)

140. Electrification on a time-bound programme of all trunk routes connecting the metropolitan cities (which have a heavy density of traffic) and a number of other high-density routes as specified is recommended.

(Paras 6.1 to 6.5)

141. Speedy execution of the Government policy for accelerating the electrification on the Railways is recommended.

(Para 3.7)

142. The Railways must fulfil the commitment of the Sixth Plan by achieving an annual rate of energisation of 500/600 route kms., and create the requisite infrastructure to achieve an accelerated rate of at least 1,000 route kms. in the Seventh Plan and beyond.

(Para 7.2)

143. To achieve this, electrification projects in the Railway Board may be put exclusively under a very senior executive.

(Para 7.3.1)

144. The country should be divided into two or three project zones e.g., the South, North and the Central, and each such Zone should be under the control of a specially selected Senior Manager.

(Para 7.3.2)

145. The Executive Head of each Electrification Zone should ensure that all projects under his control are managed efficiently, contract conditions are coordinated to ensure standards of quality and materials are procured in bulk.

(Para 7.3.3)

146. Requisite funds may be committed for electrification up to the end of each Five Year Plan right at the commencement of the Plan, and should not be subject to annual adjustments.

(Para 7.4)

147. Immediate and programmed action should be taken to augment the manufacturing capacity of important components within the country to meet the increasing needs of a perspective programme of electrification.

(Para 7.5)

148. Foot-by-foot surveys may be undertaken sufficiently in advance. The surveys may be conducted not only by the Electrification Project Organisations, but can also be contracted out to RITES, IRCON and even to Zonal Railways, as necessary.

(Para 7.6.2)

149. The success of the Programme requires liberal delegation of powers to the authorities in the Project Zones and in the field for speedy execution and for economising of time, effort and resources.

(Para 7.6.3)

150. The following measures are recommended for the speedy execution of OHE works in traffic conditions :

1. Diesel shunters should be deployed instead of steam shunters.
2. Hydraulically operated platforms on electric material trains should be used.
3. Diesel operated cranes should be used.
4. Modern wiring trains which can save on time in stringing should be used.
5. Traffic block programme should be worked out in close coordination and enforced rigidly.

(Paras 7.6.4.1 to 7.6.4.4)

151. The Railways should both up-rate and up-date the electric loco designs and develop locomotives which would incorporate all advances in technology that have taken place in the last 10 to 15 years.

(Para 9.3)

152. The Committee suggest importing a few designs/prototypes in the beginning rather than undertaking prolonged research and subjecting them to extensive field trials before finalising the same for future manufacture.

(Para 9.4)

153. To keep abreast with technology continuous lateral induction in the Electrical Engineering specially in Electronics Department should be accepted.

(Para 10.1)

154. The future recruitment of officers in Electrical Engineering should adequately provide for officers with both electrical and electronics background.

(Para 10.2.1)

155. A central Training Institute for electric traction and allied subjects be established either at Hyderabad/Secunderabad or at Bangalore where major establishments dealing with electronics such as BEL, HAL and ECIL are located. This Institute should have an adequate and knowledgeable Faculty.

(Para 10.2.2)

156. Lateral recruitment in higher supervisory grades should be permitted from amongst persons with minimum qualification of a degree in electrical or electronics engineering.

(Para 10.2.3)

157. The existing power tariff structure is neither rational nor scientific and require to be changed.

(Paras 11.1 and 11.2)

Sd./-  
Prof. Ravi J. Matthai

Sd./-  
Rusli Mody

Sd./-  
Justice H.C.P. Tripathi

Sd./-  
Mr. Manmohan Singh

Sd./-  
V.P. Sawhney

Sd./-  
H.C. Sarin  
(Chairman)

Sd./-  
Dr. S.K. Ray  
(Secretary)

1st October, 1982.





सत्यमेव जयते

भारत सरकार Government of India  
रेल मंत्रालय Ministry of Railways

# **REPORT OF THE RAILWAY REFORMS COMMITTEE**

**Part III**

**RAILWAY TRACK, BRIDGES & LANDS**

**OCTOBER, 1985**



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## INTRODUCTION

The Committee have already submitted two Reports to the Government. In the first, replacement and renewal of over-aged assets and issues pertinent to safety were discussed. The second Report dealt with Transportation.

The present Report, Part III, dwells on the permanent way, bridges and land owned by the Railways. The track, bridges and the associated land and building structures do constitute the single biggest asset of the Railways. Maintenance of these assets for satisfactory upkeep and their periodical renewal are essential to the productivity of the system and vital to safety and long-term economy.

It appears to the Committee that the Railways have not given the priority that maintenance and renewal of these assets deserved, and renewal of the permanent way has particularly suffered. During their visits to the various Zonal and Divisional Headquarters, the problem of heavy arrears of track renewal was repeatedly brought to attention of the Committee by the General Managers, Principal Officers and the Divisional Rail Managers. The Committee soon enough appreciated that there is a limit beyond which the permanent way cannot be allowed to wear out. "Contrary to what may be implied by the term, there is nothing permanent in the so-called permanent way. Every component of the permanent way requires to be maintained regularly and replaced periodically."\*

As estimated by the Committee,\*\*freight traffic to be carried by the Railways by 2,000 A.D. is expected to go

up to around three times.† To handle such a prolific quantum-jump, freight trains with much heavier trailing load would be necessary. On a selected number of high-density routes freight trains of even 4,500/7,500 tonne trailing loads would have to be run. The maximum permissible speeds of the freight trains would also have to be raised to effectively narrow down the speed-differential between freight and passenger trains.

It is the permanent way which has to bear the brunt of all these measures, and would have, therefore, to be considerably strengthened and modernised. The Committee's recommendations to improve the existing track standards, and to accelerate the rehabilitation of old and 'distressed' bridges have been made against this background.

The Railways are in possession of large areas of land. Considerable chunks of such land including some very valuable tracts in metropolitan and commercial cities and towns are at present lying unused. In the absence of an effective land-management machinery, considerable areas of vacant land have been subjected to encroachments. Railways abroad exploit their surplus land for mobilisation of additional resources by, inter alia, raising sky-scrapers on such land. Indian Railways must also utilise their surplus land for such and other similar strategies towards better resource mobilisation. The Railways should also take to afforestation on surplus land along the track, in a big way, to prevent encroachments, to improve the environment and to augment their resources.

\* Para 213, page 84, PART I of the Report of Sikri Railway Accident Enquiry Committee, 1978.

\*\* Cf. Chapter I, Profile of Traffic Growth, of Part II of the Report

of the Committee on Transportation.

† From 220 million tonnes in 1980-81 to 644 million tonnes in 2,000 A.D.



## CHAPTER 1

### TRACK

#### 1.0. Introduction.

1.1. The permanent way consists of the railway track interlaced with bridges. This, together with the associated land and building structures, do account for about 51 per cent of the Railway's investment on their assets.\*

1.2. Maintenance of these assets to a high standard and their periodic renewal are essential not only to promote Safety, but also to effectively handle the growing profile of rail-borne traffic.

#### 2.0. Growth of the network.

2.1. The growth of railway network is given in Tables 1.1(a) and 1.1(b).

2.2. The growth of route\*\* kilometres during the 30 years from 1950-51 to 1980-81 has been only 14.26 percent, while that of running† and total‡ track kilometres has been 27.89 per cent and 34.62 per cent respectively. The rate of growth after 1950-51 has been slower than in any previous 30 years since 1853. Our progress in this respect has been much slower than in the case of the Chinese Railways. China inherited a route length of 22,000 kms. in 1949 (much less than was the case in India) and has increased it to about 52,000 kms. by 1982.

Table 1.1 (a)  
Growth of route kilometres

	Route kilometres			
	B.G.	M.G.	N.G.	Total
1853	32	...	...	32
1860-61	2,554	...	...	2,554
1890-91	16,159	11,233	463	27,855
1920-21	29,282	24,539	5,771	59,592
1950-51	25,258	24,185	4,153	53,596
1980-81	31,827	25,167	4,246	61,240

*Note.*—During the First World War seven lines aggregating to 745 kilometres were dismantled to meet urgent military requirements.

On 1 April 1937 Burma Railways, a length of 3,315 kilometres were separated from the Indian Railway system.

During the Second World War, more than two dozen selected branch lines involving over 1,609 kilometres of rail length, were dismantled to provide track for military operations.

On 15 August 1947, due to the Partition of the country, a length of about 11,198 kilometres of railway fell in Pakistan.

\* This is excluding inventories, suspense and investment on commercial and public undertakings, e.g. State Road Transport Corporations.

\*\* Route kms. represent aggregate route length of railway lines.

† Some of the routes have double or multiple lines. Running track kms. represent aggregate length of railway track inclusive of the double/multiple tracks but exclusive of track laid in yards/sidings.

Table 1.1(b)

#### Growth of the network

Kilometrage	1950-51	1980-81	Percentage increase during 1950-51 to 1980-81
Route kilometres	53,596	61,240	14.26
Running track kilometres	59,315	75,860	27.89
Total track kilometres	77,609	104,480	34.62

2.3. This is partially explained by the over-whelming need of the Indian Railways to strengthen the existing throughout routes but the fact remains that, due to a number of reasons, including other competing claims for economic development on the limited resources, the Indian Railways have not been able to cover much virgin ground.

2.4. The break-up of the railway track in different gauges is indicated in Table 1.2.

Table 1.2

#### Gauge-wise kilometrage as on 31 March, 1981

Gauge	Route kms.	Running track kms.	Total track kms.
Broad	31,827	45,167	65,442
Metre	25,167	26,447	34,262
Narrow	4,246	4,246	4,776
Total	61,240	75,860	104,480

#### 3.0. Growth of traffic density.

3.1. With the introduction of high pay-load bogie wagons, gradual replacement of steam by diesel/electric locos and the increase in both the number and load of goods/passenger trains, the track has been extensively subjected to heavier axle loads and higher traffic density and speeds, even though in differing degrees. The increase in traffic density in terms of 'gross million tonne kilometres'‡, or 'net million tonne kilometres'§ per running track kilometre per annum, is given in Table 1.3 (Page 2).

†† Total track kms. represent aggregate track length inclusive of tracks laid in yards/sidings.

‡ Gross million tonne kilometres include weight of locos and rolling stock.

§ Net million tonne kilometres exclude weight of locos and rolling stock.



Table 1.3

## Growth of Traffic Density

Average traffic density	1950-51			1980-81		
	BG	MG	NG	BG	MG	NG
1. Gross million tonne kms. per track km. per annum.	4.29	1.19	0.29	8.84	2.63	0.36
2. Net million tonne kms. per track km.	1.21	0.25	0.05	3.06	0.76	0.05

3.2. Whereas the average utilization of broad and metre gauge tracks, particularly on the main arterial throughput routes has substantially increased during this period, there has been little growth in the utilization of the narrow gauge track.\*

3.3. Although the broad gauge constitutes only 52 per cent of the total route kilometres, it has accounted for 87.1 per cent of the freight tonne kilometres, and 78.6 per cent of the passenger kilometres carried by Indian Railways during 1980-81. The metre gauge, covering 41 per cent of the total route kilometres, moved during the same period only 12.7 per cent of the freight tonne kilometres and 20.7 per cent of the passenger kilometres. The narrow gauge which comprises about 7 per cent of the total railway network, accounted for residual 0.2 per cent of the freight tonne kilometres and 0.7 per cent of the passenger kilometres. The bulk of the traffic, both passenger and freight, is thus carried by the broad gauge tracks, out of which again the quadrilateral and diagonal routes move an overwhelming share.†

3.4. On the broad gauge, the proportion of running track kilometres presently carrying annual traffic density in excess of 20 GMT or between 10 and 20 GMT is given in Table 1.4.

Table 1.4

## GMT moved

	Kms.
1. Track length having traffic density of over 20 GMT per annum.	3,000
2. Track length having traffic density between 10 and 20 GMT per annum.	14,000
	17,000
3. Track length having traffic density less than 10 GMT per annum.	28,167

3.5. On the metre gauge, about 3,000 out of 26,447 running track kilometres presently carry traffic in excess of 5 GMT per annum.‡

## 4.0. Estimated growth.

4.1. Broad gauge.—By 2000 A.D., the originating freight traffic on the Indian Railways is estimated to go up three times (Cf. page ii). Bulk of the increase can be expected to be on the high-density broad gauge tracks,

carrying more than 10 GMT per annum as referred to in paragraph 3.4 above. It has been assessed that the lengths of broad gauge in different ranges of traffic density by 2000 A.D. would be as indicated in Table 1.5

Table 1.5

## Track kilometrage in different GMT ranges in 2000 A.D.

GMT ranges	Running track kilometres
1. Above 20 GMT per annum .. ..	15,000
2. Between 10 and 20 GMT per annum .. ..	15,000
Above 10 GMT per annum	30,000
3. Below 10 GMT per annum .. ..	Balance

4.2. The importance of these 30,000 kms. of running track clearly stands out in the overall freight movement profile. This kilometrage in fact comprises the quadrilateral, the diagonals, the mineral routes of the Eastern sector and a few other high-density routes these between them presently carry around 70 per cent of the total freight traffic. This percentage, despite a prolific growth, would roughly remain the same during the next two decades.

4.3. Metre gauge. As for the metre gauge, even after conversion to broad gauge of the heavy density metre gauge tracks referred to in para 3.5 above, there will still remain certain routes on Northern, Western and Southern Railways, where freight and passenger traffic can be expected to increase in future. It has been assessed that even after the completion of the sanctioned conversion projects, the aggregate track lengths remaining in the metre gauge system with traffic density of more than 5 GMT per annum would be around 3,000 kms. by 2000 A.D.

4.4. Overall position. The Committee, therefore, recommend that the thrust of track modernisation should be directed to the 30,000 kms. of broad and 3,000 kms. of metre gauge track, as indicated in paragraphs 4.2 and 4.3 above, as these would be subjected to annual traffic density of over 10 GMT and 5 GMT respectively. Even within this kilometrage, priority should be accorded to the 15,000 kms. of broad gauge track which is likely to carry traffic density of over 20 GMT per annum by 2000 A.D. What is more important is that the 20 GMT per annum BG/tracks would be called upon to move the preponderant portion of the total traffic.

## 5.0. Track standards.

5.1 Broad gauge.—On the broad gauge, routes are classified in Groups A, B, C, D and E, depending upon the maximum permissible speeds on these routes. The existing track standards for various categories of broad gauge routes are given in Table 1.6 (page 8).

5.2 Metre gauge. On the metre gauge, routes have been classified into trunk routes, main lines and branch lines, depending upon the maximum permissible speeds and the traffic density carried. Track standards

\* In Chapter II, Part II, the Committee have recommended phased closure of the NG network, except for the hill sections and the Central Indian system.

† The quadrilateral routes are those which connect Calcutta-Delhi, Delhi-Bombay, Bombay-Madras and Madras-Calcutta. The diagonal routes connect Calcutta to Bombay and Delhi to Madras.

‡ A major portion of this kilometrage is, however, sanctioned for conversion to broad gauge. In respect of the proposed conversion of a number of such routes, the Committee have serious reservations as explained in depth in Chapter II on Transport Planning Part II of their Report on Transportation. On a number of these route where conversion is not taken up, there should be further optimisation of the metre gauge by fresh inputs.



laid down for the various classes of routes are given in Table 1.7 (page 8).

5.3. These standards have not so far been fully attained either on the broad or the metre gauge, even though the same were approved for adoption more than ten years back. For instance, on the broad gauge 52kg./60 kg. per metre rails should have been provided on a track length of about 26,000 kms. (Group A, B, C and such portions of Group D routes which carry traffic density in excess of 10 GMT per annum); these rail sections have, however, been provided only on about 15,000 track kilometres so far. Similarly, 37.2 Kg./m

Table 1.6

## Existing BG track standards

S. No.	Traffic density (GMT per annum)	Group A routes (speeds upto 160 km/h)	Group B routes (speeds upto 130 km/h)	Group C routes (suburban sections) (speeds upto 100 km/h)	Group D routes (speeds upto 100 km/h)	Group E routes (speeds below 100 km/h and branch line sections)
R.Ls (kg./m)						
1.	Over 20	60	60	60	60	Released rails of 44.6 kg./m section and above.
2.	From 10 to 20	52	52	52	52	
3.	Under 10	52	52	52	44.64	
Sleeper density (nos./km.)						
4.	Over 20	1,540*	1,540*	1,540	1,540	1,310
5.	From 10 to 20	1,540	1,540	1,540	1,540	1,310
6.	Under 10	1,540	1,540	1,540	1,310	1,310
* When the speed is increased beyond 130 km/h this may be raised to 1,660/Km.						
Ballast cushion (cms.)						
7.		30	25	25	20	15

Table 1.7

## Existing MG track standards

Classification	Rails (kg./m)	Sleeper density (nos./km)	Ballast cushion (cms.)
1. Trunk routes—nominated for ultimate speed of 100 km/h.	37.20†	1,540	25
2. Main lines—traffic density more than 2.5 GMT per annum or maximum permissible speed of 75 km/h.	37.20†	1,540	25
3. Branch lines—traffic density less than 2.5 GMT per annum and maximum permissible speed less than 75 Km/h.	29.76	1,310 to 1,540	15 to 20

rails should have been provided on about 14,500 kms. of track on trunk routes and main lines of the metre gauge, but again such rail section has been provided on less than 50 per cent of this track kilometrage. Similar is the case with sleeper density and ballast cushion. It will be seen from subsequent paragraphs that these

track standards are inadequate in certain respects to cope with the present and future needs of traffic. What is disconcerting is that even these lower standards have not as yet been fully achieved.

5.4. The above track standards were laid down in 1972 for broad gauge, and in 1968 for metre gauge. The concept of running 4,500/7,500 tonne freight trains at speeds upto 90 km/h on broad gauge had not taken shape at that time. As for the metre gauge, the prevailing opinion then being in favour of their eventual conversion into broad gauge, the question of uprating and strengthening of metre gauge tracks with a view to increasing their throughput and speed had not also received attention. As already brought out in Part II of the Committee's Report, a very large proportion of metre gauge track would continue to exist in the foreseeable future, and would, therefore, need to be strengthened to the standards mentioned above and in paragraph 6.2.

5.5. A comparison of the track standards in use on some Railways abroad with those on the Indian Railways is given in Table 1.8

Table 1.8

## Track standards on Railway abroad

Country	Rail section (kg./m)	No. of sleepers/km.	Ballast cushion (cms.)
France	50 to 60	1,666	20 to 25
Germany	49 to 60	1,250 to 1,540	30
USSR	50 to 75	1,872	25 to 35
China	43 to 60	1,600 to 1,920	30 to 40
Japan (standard gauge).	60	1,720	25
Japan (metre gauge).	50 to 53	1,450 to 1,720	25
India (broad gauge).	44.64 to 52	1,310 to 1,540	15 to 30
India (metre gauge).	29.76 to 37.2	1,310 to 1,540	15 to 25

5.6 It will be seen from the above statement that most of the Railway systems abroad have adopted heavier rail sections and higher sleeper densities as compared to ours. With the heavy increase in traffic density expected by 2000 A.D., the existing track standards would no more be adequate. There is yet another reason why the track standards should be improved. With heavy track structure, permanent way requires less maintenance, and need for renewal is at longer intervals. The Committee have accordingly reviewed the existing track standards and their recommendations are given in the succeeding paragraphs.

† On 13 important metre gauge routes indicated in the Railway Board's letter No. Track 021/77/0513, dated 31 December, 1977 to the General Managers, use of 44.64 kg/m rails has been specified.

‡ Conditions in India and those prevailing abroad may not be identical, but these do indicate the latest trend in track standards in the railways abroad, and these do spotlight the lag in the Indian permanent way.



## CHAPTER 1

### TRACK

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1950-51	25,258	24,185	4,153	53,596
1980-81	31,827	25,167	4,246	61,240

*Note.*—During the First World War seven lines aggregating to 745 kilometres were dismantled to meet urgent military requirements.

On 1 April 1937 Burma Railways, a length of 3,315 kilometres were separated from the Indian Railway system.

During the Second World War, more than two dozen selected branch lines involving over 1,609 kilometres of rail length, were dismantled to provide track for military operations.

On 15 August 1947, due to the Partition of the country, a length of about 11,198 kilometres of railway fell in Pakistan.

\* This is excluding inventories, suspense and investment on commercial and public undertakings, e.g. State Road Transport Corporations.

\*\* Route kms. represent aggregate route length of railway lines.

† Some of the routes have double or multiple lines. Running track kms. represent aggregate length of railway track inclusive of the double/multiple tracks but exclusive of track laid in yards/sidings.

Table 1.1(b)

#### Growth of the network

Kilometrage	1950-51	1980-81	Percentage increase during 1950-51 to 1980-81
Route kilometres	53,596	61,240	14.26
Running track kilometres	59,315	75,860	27.89
Total track kilometres	77,609	104,480	34.62

2.3. This is partially explained by the over-whelming need of the Indian Railways to strengthen the existing throughout routes but the fact remains that, due to a number of reasons, including other competing claims for economic development on the limited resources, the Indian Railways have not been able to cover much virgin ground.

2.4. The break-up of the railway track in different gauges is indicated in Table 1.2.

Table 1.2

#### Gauge-wise kilometrage as on 31 March, 1981

Gauge	Route kms.	Running track kms.	Total track kms.
Broad	31,827	45,167	65,442
Metre	25,167	26,447	34,262
Narrow	4,246	4,246	4,776
Total	61,240	75,860	104,480

#### 3.0. Growth of traffic density.

3.1. With the introduction of high pay-load bogie wagons, gradual replacement of steam by diesel/electric locos and the increase in both the number and load of goods/passenger trains, the track has been extensively subjected to heavier axle loads and higher traffic density and speeds, even though in differing degrees. The increase in traffic density in terms of 'gross million tonne kilometres'‡, or 'net million tonne kilometres'§ per running track kilometre per annum, is given in Table 1.3 (Page 2).

†† Total track kms. represent aggregate track length inclusive of tracks laid in yards/sidings.

‡ Gross million tonne kilometres include weight of locos and rolling stock.

§ Net million tonne kilometres exclude weight of locos and rolling stock.



### 8.0. Sleeper fastenings.

8.01. In the past, the Indian Railways have been using conventional sleeper fastenings of the rigid type. To cope with the increase in traffic density and speeds, rigid fastenings are being gradually replaced by elastic fastenings. Elastic fastenings are also an essential pre-requisite for concrete sleepers. The Railways have been experiencing difficulties not only in the procurement of adequate number of elastic fastenings at reasonable rates, but also in the development of newer and improved types of elastic fastenings. The Committee have been advised that the private sector is not coming forward to invest in the production of improved designs of elastic clips evolved by the RDSO.

8.2 The main reason for reluctance on the part of the private sector appears to be the hesitation by the Railways to confirm acceptance of supply of these items on a long-term basis.

8.3. The Committee, therefore, recommend that for such developmental items, the Railway should assure the industry of steady orders for a minimum period of five years after full production is established on the accepted time schedule. This, in fact, is being done by the Department of Defence Supplies for the procurement of such new items.

### 9.0. Ballast.

9.1. Ballast is an essential part of the track structure and performs the vital functions of reducing formation-pressure, providing longitudinal and lateral resistance to the movement of sleepers and acting as an elastic medium between the sleepers and the formation. Ballast also provides drainage for the track and serves as a medium by which the track geometry can be corrected and maintained to the requisite standards. Elasticity imparted to the track by ballast helps not only in improving the maintenance of the track, but also in enhancing the life of the components. Ballast thus is central to the up-keep of the track to the requisite standards of safety and comfort.

9.2. Even though the standard for ballast cushion laid down both for broad and metre gauges is adequate, the actual ballast cushion now existing on the track is below the prescribed standards. The Committee, during their visits to the Zonal Railways, have been frequently advised that the depth of ballast cushion existing even on some of the trunk routes and main lines was deficient and did not conform to the prescribed standards. We, therefore, recommend that urgent action should be initiated to enhance the depth of ballast cushion, so as to bring it up to the standards laid down by the Railways themselves, and indicated in Tables 1.6 and 1.7.

9.3. Clean ballast cushion is vital to safe and efficient maintenance of track. For mechanised maintenance this is not only desirable, but is also a pre-requisite. When ballast gets contaminated with heavy percentage of dust (dirt), elasticity of the track structure, packing and drainage are adversely affected. The Committee endorse the recommendation of the Wanchoo Committee, 1968 that whenever the content of clean ballast in a stretch of track falls below 35 percent, complete re-ballasting should be carried out.

#### 10.0. Procurement of ballast.

10.1. The total quantity of ballast existing on running track of all gauges on Indian Railways has been assessed at 65 million cubic metres. It is understood that four percent of the quantity of ballast in the track

is wasted away every year due to attrition. The requirement of ballast to make up for the wastage, and also to bring up the cushion to the prescribed standard, has been assessed at 6.5 million cubic metres per year. As against this, the Sikri Committee, in Part I of their Report in 1978, had found that during 1973-78, the total quantity of ballast procured for recoupment or raising of ballast cushion or for track renewal averaged at only 2.68 million cubic metres per annum. Information obtained from the General Managers of the Railways indicates that the quantity of ballast procured during the last three years has been of the order indicated in Table 1.10

10.2. Though there has been some improvement in the procurement of ballast during 1980-81 and 1981-82, the total availability of ballast has fallen short of the requirement. The Committee recommend that procurement of ballast should be raised to 6.5 million cubic metres per annum. Otherwise, the Railways will not be able to retrieve the shortfall in the ballast cushion.

Table 1.10

#### Procurement of ballast

Year	Quantity of ballast (in million cu.m)	Cost in (crores of rupees)
1979-80	2.51	16.12
1980-81	2.60	18.22
1981-82	3.26	23.62

10.3. The main difficulties experienced in the procurement of adequate quantity of ballast have been both lack of resources and availability of ballast trains. The cost of ballast varies from place to place and the average cost now is broadly Rs. 100 per cubic metre. At this rate, for 6.5 million cubic metres of ballast, the requirement of funds works out to Rs. 65 crores per year. Funds actually available during 1981-82 were, however, only Rs. 23.62 crores. The Committee recommend that allotment of funds for ballast by the Government in future should be raised to Rs. 65 crores per year at 1981-82 prices. Economy in this area is fraught with undesirable consequences and even heavier expenditure later.

10.4. For augmenting the availability of ballast, not only the number of ballast quarries would have to be increased, but production and loading of ballast would also have to be mechanised.

10.5. It is understood that contractors are reluctant to make investments on plant and machinery for mechanisation of ballast quarries, because the present system of awarding contracts is only for a period of one or two years at a time. It will be desirable to increase the period of contract to at least five years. An appropriate clause to cater to fluctuations in prices should always be incorporated in the contract to take care of any rise or fall in prices.

10.6. The Committee also consider that every Zonal Railway should develop one or two departmental ballast quarries at convenient locations. Such quarries should have full equipment for mechanised production and loading of ballast. This arrangement would help in not only augmenting the availability of ballast, but also in keeping the rates of ballast procured through contractors at a reasonable level.



10.7. Another constraint in the 'training out'\* of ballast is the availability of adequate number of hopper wagons and diesel/electric locos for running the ballast trains. Sufficient number of hopper wagons should be arranged for each Zonal Railway. As already brought out in Part II of the Committee's Report, steam locomotive, when it is put to intermittent use on ballast trains, is inefficient and frequently counter-productive as it cannot be switched on and off unlike diesel and electric locos; and loco requirements for coaling, watering, etc. reduce the actual time of useful work considerably. The Committee, therefore, reiterate that priority should be given to allotment of suitable diesel/electric locos for ballast trains.

#### 11.0. Track renewal.

11.1. The Government's attention has already been drawn to the heavy arrears\*\* of track renewal in Part I of the Report. On 31 March 1982, in terms of complete track renewal (CTR),† the backlog had increased to 10,300 kms. of primary and 6,540 kms. of secondary renewals. The Committee, therefore, made an in-depth study of the problem and found that a major portion of the arrears of primary track renewal is unfortunately concentrated on the high-density routes. This is indicated below :—

##### BG routes

Arears on—

Group A routes	...	≈ 3,000 kms. (TRR)
	...	≈ 4,000 kms. (TSR)
Group B routes	...	≈ 2,600 kms. (TRR)
	...	≈ 3,000 kms. (TSR)
Group C routes	...	≈ 500 kms. (TRR)
	...	≈ 200 kms. (TSR)

##### MG routes

Arears on—

Trunk routes	...	≈ 900 kms. (TRR)
	...	≈ 1,500 kms. (TSR)
Main lines	...	≈ 2,300 kms. (TRR)
	...	≈ 3,100 kms. (TSR)

11.2. The average allotment of funds‡‡ (net) and the progress of track renewal during the various plan periods, are given in Table 1.11.

Table 1.11

#### Progress of track renewal

Plan period	Net average annual expenditure (in crores of rupees)	Average annual progress of track renewal (in kms.)	
		Primary	Secondary
Second (1956-61)	30.85	1,900	530
Third (1961-66)	43.05	2,600	620
Inter (1966-69)	29.30	1,700	500
Fourth (1969-74)	31.64	1,300	360

\* Moving ballast by means of departmental ballast trains.

\*\* Cf. Paragraph 2.1, of Committee's Part I Report.

† Complete Track Renewal (CTR) implies renewal of all the components of track over a particular length. It, therefore, comprise renewal of all the rails known as Through Rail Renewal (TRR) and renewal of all sleepers and fastenings known as Through Sleeper Renewal (TSR).

Necessary recouping of ballast cushions is also done along

Plan period	Net average annual expenditure (in crores of Rupees)	Average annual progress of track renewal (in kms.)	
		Primary	Secondary
Fifth (1974-78)	35.07	950	290
Inter (1978-79)	52.70	730	276
(1979-80)	75.15	765	210
Sixth (1980-85)	...	...	...
1980-81)	70.00	880	216
(1981-82)	130.00	1,200	300

11.3 The progress of renewal broadly matched with the requirement only during the Third Five Year Plan. In later years, particularly from 1959 onwards, there was a steep increase in the cost of permanent way materials. The prices of rails escalated from Rs. 760 per tonne in 1969 to Rs. 3,850 per tonne in 1982, and that of steel sleepers from Rs. 64 per sleeper to Rs. 290 per sleeper. The average cost for complete track renewal thus shot up from Rs. 1.50 lakh per kilometre to Rs. 10 lakh per kilometre during this period. There has, unfortunately, been no matching increase in the allocation of funds, to cope with the escalating price level. This led to the accumulation of heavy arrears of track renewal, which is responsible for an increasing penalty not only in speed, safety, and efficiency, but also in a distressing accumulation in the requirement of resources for arrears of track renewal.

11.4 Table 1.12 shows that the annual gross expenditure on track renewal as a percentage of the total expenditure under DRF ranged between 42.20 and 63.64 percent during the period 1961-62 to 1979-80, except for the years 1975-76 and 1976-77. Thereafter this percentage started decreasing. The fall in the percentage was precipitate in 1982-83 for which the budgeted gross expenditure on track renewal forms only 28.34 percent of the total expenditure under DRF.

11.5 In 1980-81 and 1981-82, funds for track renewal, in absolute terms, were increased to Rs. 124 and 165 crores respectively and this enabled the Railway to complete comparatively larger length of track renewal than in the previous few years. Even this increased allotment of funds, however, fell far short of the actual requirement. In 1982-83, gross fund allotted for track renewal, instead of being considerably increased, were again reduced to Rs. 161 crores. It is understood that the Railway Board is now programming an increase in the gross funds for track renewal by Rs. 30 crores. This increase, though welcome, would be inadequate to cover even the recent inflationary escalation in prices of permanent way materials.

#### 12.0 Implications of postponement.

12.1. Retention of over-aged track in service not only involves increased cost of maintenance but also affects the safety and fluidity of movement, and makes it increasingly difficult to arrange adequate traffic blocks for this work. The mounting backlog of track renewal has led to more and more lengths of track being put

with the CTR.

‡‡ Actual expenditure on track renewal i.e. the gross expenditure also includes funds raised from the sale of scrap rails and other track materials, and is higher than the net expenditure which represents the allotment made by the Planning Commission under this budget-head.

@ This is being arranged out of the additional mid-term allotment of Rs. 190 crores towards 1982-83 Annual Railway Plan.



Table 1.12  
Expenditure on track renewal vis-a-vis total  
DRF expenditure

(In crores of rupees)

Year	Total gross expenditure under DRF including expenditure on track renewal	Gross expenditure on track renewal	Percentage of gross expenditure on track renewal to total gross expenditure under DRF
1961-62	68	41	60.29
1962-63	86	44	51.16
1963-64	85	54	62.22
1964-65	90	56	63.64
1965-66	92	45	48.91
1966-67	96	44	45.83
1967-68	109	49	44.95
1968-69	100	50	50.00
1969-70	97	48	49.48
1970-71	109	46	42.20
1971-72	106	51	48.11
1972-73	130	56	43.08
1973-74	141	63	44.68
1974-75	131	61	46.56
1975-76	144	46	31.94
1976-77	160	58	36.25
1977-78	147	67	45.58
1978-79	167	71	42.51
1979-80	205	89	43.41
1980-81	301	124	41.19
1981-82 (RE)*	531	165	31.07
1982-83 (BE)**	568	161	28.34

under speed restrictions of varying degrees. The disquieting position is indicated below :—

The length of track under speed restriction as on :

31st March, 1968	...	780 Kms.
31st March, 1978	...	1,996 Kms.
31st March, 1982	...	2,295 Kms.

\* Revised estimate.

\*\* Budget estimate.

† In Chapter VI on Traction Policy in Part II of the Committee's Report on Transportation, the Committee have worked out a programme for early phasing out of steam locomotives.

12.2. Due to the increasing arrears in track renewal-rail fractures have also shown a rising trend as indicated below :

Rail fractures in :

1967-68	...	1,181 Nos.
1977-78	...	2,293 Nos.
1981-82	...	4,900 Nos.

Every rail fracture upsets movement of trains and is a potential hazard to safety.

12.3. There is yet another drawback in the postponement of primary renewal. In the case of primary renewal, rails and other track materials released from the trunk routes and main lines do have some residual life, which makes such materials fit for use in secondary renewal. The postponement of primary renewal will thus not only affect the safety and speed on the trunk routes and main lines, but will also reduce the availability of second hand track materials for secondary renewal. This will have a deleterious repercussion on keeping the branch lines, yards and sidings in good and safe condition.

12.4. Furthermore, on a large number of branch lines, having lighter sections of rails, only light-axle steam locomotives are presently permitted to operate. Since the light-axle steam locos are rapidly getting over-aged, they will be condemned and withdrawn from service in the near future,† only heavy-axle steam/diesel locos would thereafter have to operate on these branch lines. The Committee have been told that there are still about 8,000 kms. of track on the branch lines on the metre gauge, where rails of 50 lbs/yard or lighter sections still exist. Similarly, on the broad gauge, about 1,200 kms. of branch line tracks still have rails of 75 lbs/yard. It is also, therefore, essential that the track on these branch lines is upgraded through secondary renewal for operation of heavy-axle locos.

12.5. Funds for track renewal.—The Committee reiterate that urgency for allotment of funds for track renewal has not been fully recognised. They would again recommend that the availability of funds\*\* for track renewal is vital and should be increased to the level indicated in Part I of their Report i.e. Rs. 430 crores ‡ per year at current prices till the arrears are wiped out. Thereafter, the requirement of funds would reduce to cater to the current arisings of about 2,300 kms. of primary and 900 kms. of secondary renewals. The figures of current arisings are based on the present track kilometrage of 104,480 kms. and will increase proportionately due to the annual accretions in this Kilometrage, on account of construction of new lines, doubling of existing lines etc.

### 13.0. Organisation for track renewal.

13.1. Track renewal on Indian Railways has traditionally been executed with manual labour. This was possible since the track structure in use was light and could be laid manually. With prolific increase in traffic density on the trunk routes and main lines, the Railways have out of compulsion gone in for modern track structure, which involves use of concrete sleepers and long welded or continuously welded rails. Concrete sleepers are heavy and essentially need mechanised handling.

\*\* The Committee propose to deal exhaustively with the subject of funds for renewal and rehabilitation of assets in Part IV of their Report on Railway Reserve Funds.

‡ Cf. Paragraph 8.1.3, of the Committee's Part I Report.



Increasing difficulty in giving block times also needs quicker rate of work. As a result, mechanisation of track renewal on high-density routes, where modern track structure is to be provided, has become inescapable.

13.2. As for the branch lines and light-density routes, where conventional track structure will continue to be in use at least for the near future, manual methods of track renewal could continue.

13.3. In Part I of their Report, the Committee have suggested that the Railways would have to undertake, on an average, 3,300 kms. of primary and 1,500 kms. of secondary renewals every year till the arrears are liquidated. In primary renewal about 1,700-1,800 kms. per year would be on the high-density routes, where modern track with concrete sleepers will have to be provided with mechanised equipment.

13.4. The Sikri Committee (1980) recommended that :

"We feel that an all-India organization under the charge of a separate General Manager, encompassing the functions of planning of renewals, procurement of permanent way materials and execution of track renewals in the field, is called for. In setting up the proposed organization the Railways should draw upon their experience with the Railway Electrification Organisation, which was established on similar lines". (Para 219, page 39, Part II, 1980).

The Committee fully appreciate that renewal of track on a massive scale now found necessary has never been undertaken by the Railways in the past, nor do they have an organization adequate in strength and equipment to cope with such a programme. The parallel between track renewal and Railway Electrification may, however, not be valid. Railway Electrification is concentrated on a few trunk routes whereas track renewal has to be undertaken on almost all the routes spread over the entire country. Further more, open line organisations both at the Divisional and at the Zonal levels are very intimately involved in the track renewal works. The Committee, therefore, recommend that instead of setting up a separate organisation for track renewal, the existing organisation, particularly at the field level, should be considerably strengthened. Such a step is considered necessary since the track renewal programme involves heavy outlay and is integral to both safety and efficiency of operations.

13.5. At present, only six sets of equipment for mechanised track renewal are available with the Railways. Due to inadequate availability of traffic blocks in the past, the average progress per month of track renewal for each set of equipment has been limited to four to five kms. only. With improved and coordinated availability of traffic blocks, each set of relaying equipment should be able to renew about eight kms. of track per month, i.e. about 60 kms. per year during the working season extending from October to May. On this basis, about 30 sets of mechanised track renewal equipment will be required to undertake 1,700-1,800 kms. of primary track renewal per annum, involving the use of concrete sleepers on high-density routes. The Committee understand that there is no difficulty in the indigenous procurement of mechanised equipment for track renewal. It is, therefore, recommended that the Railways may

expeditiously arrange additional 24 sets of equipment for mechanised renewal of track, along with matching number of tamping machines\*.

#### 14.0. Track maintenance.

14.1. Until recently, almost the entire length of track on the Indian Railways used to be maintained manually. For the modern type of track structure with concrete sleepers, as already mentioned, mechanised maintenance is essential; on such track, with manual maintenance and beater packing it is not only impossible to maintain the track to the exacting standards needed for the trunk routes and main lines, but the concrete sleepers also get damaged by manual beater packing.

14.2. By the turn of the century, due to the heavy increase in traffic density, it is estimated that about 30,000 kms.† on the broad gauge and 3,000 kms.† on the metre gauge will need to be provided with modern track structure. The Railways will, therefore, have to plan for introducing mechanised maintenance for this track kilometrage.

#### 15.0. Track maintenance machines.

15.1. At present, the Indian Railways have 72 tie-tamping machines for mechanised maintenance of track. The requirement of tamping machines for maintenance by the turn of the century has been assessed as about 220 Nos. This number has been calculated on the basis of one machine maintaining 150 kms. of track annually. The present performance for each machine is about 120 kms., as against over 200 kms. abroad. With better coordination of both blocks and execution, it should be possible to first achieve 150 kms. and then improve upon it. Matching number of points and crossing machines and ballast cleaners would also have to be procured. The Committee understand that these machines also are now being manufactured indigenously.

15.2. To synchronise with the programme the Committee recommend a phased plan for procurement of (220-72)-148 Nos. of tie-tamping machines as in Table 1.13.

Table 1.13

#### Programme for procurement of tie-tamping machine

Plan	No. of machines
(Already available)	(72)
remaining years,	Sixth 16
Seventh	45
Eighth	45
Ninth	42
	Total 220

15.3 Adequate facilities for periodical overhaul (POH) of these Machines would also have to be developed. We recommend that three PCH shops for servicing these machines may be set up at the following locations.‡

One at Allahabad to serve Eastern, Northern, North Eastern and North East Frontier Railways.

One at Secunderabad to serve Southern and South Central Railways.

One at Manmad to serve Central, Western and South Eastern Railways.

\* These are track maintenance machines required for compacting the ballast under the sleeper

† Cf. Paragraph 7.4

‡ The Committee have recommended the locations on the basis mainly of logistics. The Railways can make their own choice on the basis of a detailed examination.



15.4. The above POH shops will undertake major overhauling of machines and would also be responsible for procuring, stocking and distribution of spare parts. Besides these, smaller servicing units on each Railway would also need to be set up for attending to day-to-day maintenance of the machines and for stocking of critical fast-moving spares and other consumables.

#### 16.0. Organization for track maintenance.

16.1. On those routes where track maintenance will continue to be done manually, improved methods such as directed track maintenance (DTM)\* etc. will have to be used on a much larger scale. For such improved methods of track maintenance, gang work is supervised by permanent way mistries instead of gang-mates: the former expected to have a higher level of skill and literacy than the gang-mates. It has, however, been brought to the notice of the Committee that recruitment for permanent way mistries to the extent of 100 per cent is done from amongst the gangmen, who are mostly illiterate. To improve the standard of permanent way mistries, it is recommended that 50 per cent posts of such mistries are invariably filled by direct recruitment from the open market, leaving the remaining 50 per cent for promotion from amongst gangmen, preference being given to those who have read at least upto eighth standard. They will also have to be given adequate training to bring up their standard of skill.

16.2. Even on these routes where mechanised maintenance would be introduced, there are certain maintenance activities like slak-nicking, clearing of side drains, attention to level crossings, renewal of isolated rails or sleepers etc., which will continue to be done manually.

16.3. The gang strength required for these activities will, however, be considerably less than the existing strength based on the prevalent system of manual maintenance. The subject of gang strength for track maintenance was recently studied by a Special Committee, appointed by the Railway Board, of Chief Engineers of Railways and Directors of the Railway Board and the RDSO. In terms of the recommendations of the Special Committee, the total strength of gangs for track maintenance on the Railways should be about 1,82,500 men against the present strength of 1,64,200 men. The Special Committee, however, also recommended that the gang strength of such of the routes as are provided with modern track structure (concrete sleepers and long welded or continuously welded rails and on which mechanised maintenance is introduced, should be half of that needed for manually maintained routes. Augmentation of the gang strength of 1,82,500 men will, therefore, not be necessary, if the Railways ensure that, simultaneously with the introduction of modern track structure and mechanised maintenance on the 33,000 kms. of track identified in para 14.2, the gang strength for them is reduced to half.

16.4. The Committee would, therefore, recommend as under :

1. Not only that the gang strength for maintenance

is not increased beyond the present level, but, in keeping with the gradual introduction of modern track structure and mechanised maintenance, the gang strength should be reduced, through normal wastage, as per the yardstick, recommended by the Special Committee, referred to in para 16.3 above.

2. With such gradual introduction of modern track structure and mechanised maintenance, there should be improvement in the quality of personnel, in terms of education, skill and training.

16.5. With the introduction of modern track structure and mechanised maintenance, the strength of gang required for such activities as slack picking, clearing of side drains, attention to level crossings etc., will reduce to half of the normal strength required for manual maintenance, and the existing gang beats will therefore, no longer remain viable or workable units. The Committee therefore, suggest that two to three adjoining gangs should be merged, and converted into one mobile gang with an enlarged beat. The mobile gang should be equipped with simple rail-cum-road transport which can be used to carry the gang as also their tools to the site of work.

16.6. During the course of their visits to the zonal Railways, the Committee did come across poor maintenance of tracks laid in yards and workshops. There was inadequate drainage and absence of regular cleaning arrangements in the yards. Track structures in some of these, yards had lighter and non-standard rail sections and ballasting of track was nearly non-existent. There were complaints from engineering staff that yard lines were not being made available to them for maintenance, resulting in deterioration in their condition. The Committee therefore, recommend that the structure of the track in the yards should be upgraded to that prevailing on the running lines and the yard lines should be ballasted. Drainage in the yards should be improved. Tracks in the yards should be made available for maintenance on the basis of a planned schedule. At stations washable aprons ‡ should be provided on busy passenger platform lines under the tracks on a time-bound programme. This would enable to improve the cleanliness and drainage of the platform lines.

#### 17.0. Welding of rails.—

17.1. As part of the strengthening and modernisation of the permanent way, the Railways have gone in for welding of rails. The conventional fish-bellied track with joints every few metres which contribute to the 'clackety clack' of rail travel, is now giving place to short-welded and long-welded rail panels. On the trunk routes and main lines, rails are being welded into LWR/CWRs of lengths of one kilometre or more. On the other routes, short-welded rail panels i.e. three rails welded together to form a single welded rail panel of 39 metres length are being used.

\* In the system of 'Directed Track Maintenance (DTM)' track is attended to only at those locations where it has been found necessary to do so after an examination and measurements of track parameters. On the other hand, in the 'conventional system of maintenance', track is maintained on a cyclic basis from one end of the gang beat to the other.

† This is considered essential not only in the interest of safety but also productivity.

‡ A washable apron is a reinforced concrete floor under the track which improves drainage and cleanliness.

§ Long welded rail/Continuously welded rails, LWR has a length of one kilometre whereas there is no restriction on the length of CWR. The longest CWR existing on the India Railways is 35 kilometres.



17.2. The pace of progress of welding of rails in our Railways has been indicated in Table 1.14.

Table 1.14  
Progress in the welding of rails

Year ending 31st March	Aggregate length of welded track includ- ing LWR/CWR track.	Length of LWR/ CWR track.
1962	4,625 kms.	Nil
1968	15,220 kms.	192 kms.
1978	33,900 kms.	5,200 kms.
1981	40,883 kms.	7,800 kms.
1982	42,040 kms.	8,582 kms.

17.3. The welding of rail have many advantages which include :

1. Improved maintenance of track
2. Economy in maintenance of track
3. Economy in consumption of fuel
4. Reduction in the level of noise
5. Reduction/elimination of rail joints, promoting safety.
6. Less wear and tear and consequently longer life for both track and rolling stock.

17.4. The Committee, therefore, recommend that the progress of welding of rail should be accelerated. The aim should be to provide LWR/CWR on the entire high density kilometrage of track aggregating to 30,000 kms. of BG and 3,000 kms. of MG. Besides, the entire remaining kilometrage of track should also be provided with short-welded panels in the near future.

17.5. The Committee also find that in some of the major classification yards considerable reduction in the number of derailments has been achieved through the welding of rails. The Committee were told that the welding of rails in major yards like Kanpur Juh not only reduced derailments, but also improved track maintenance and enhanced the life of rails. The Committee, therefore, recommend that the Railways should go in for welding of rails also in the major yards in a big way and should complete the work within the Seventh Plan.

#### 18.0. Ultrasonic testing.

18.1. The Committee referred, in para 12.2, to the increasing incidence of rail fractures, which is resulting from the mounting backlog of track renewal. Rail fractures not only disrupt train movements, but also pose hazards to safety. The Sikri Committee had found that the number of mid-section derailments on account of rail fractures increased from seven during the period 1971-72 to 1972-73, to 20 during the period 1973-74 to 1977-78. There has been further increase in the mid-section derailments resulting from rail fracture as seen from Table 1.15.

Table 1.15  
Mid-section derailments due to rail fractures

Year	Number
1972-79	7
1978-79	5
1980-81	9
1981-82	16

18.2. In this connection the Committee consider ultrasonic testing of rails an essential and effective means of detection of rail flaws with a view to identifying and eliminating rails prone to fracture. Testing of rails is presently done with manually perated ultrasonic rail flaw detectors. This is not considered adequate. The Sikri Committee had pointed out that "the inference drawn during testing by ultrasonic rail flaw detectors depend considerably on the ability of the individual operators to identify and interpret signals received on the oscillograph screen. A continuous scanning by the operator is a difficult and fatiguing task, and the operator is likely to miss or wrongly interpret the signals received on the screen during continuous movement of the instrument on the rails". The Sikri Committee had accordingly recommended provision of recording arrangement on ultrasonic rail flaw detectors, so that necessary records would be available for scrutiny after the recording session was over. No action appears to have been taken by the Railways on this recommendation. Early arrangements for providing recording arrangements in ultrasonic rail flaw detectors should be made.

18.3. To speed up the work, the Wanchoo Committee had recommended that self-propelled ultrasonic rail inspection cars be developed and used for testing of rails. Since no action has as yet been taken to develop ultrasonic rail inspection cars, we had recommended in Part I of our Report that nine Nos. of these cars should be imported by the Railways. In view of the heavy arrears of track renewal, the Committee reiterate the recommendation for urgent implementation.

#### 19.0 Points and Crossings.

19.1. Points and crossings form a vital, but delicate portion of the permanent way, "The existing design of points and crossings has many inherent defects and as such considerable burden is thrown on the maintenance staff in maintaining the track geometry on such points and crossings. The ultimate aim should be to evolve a stronger design of points and crossings incorporating the latest advances in the designs adopted by other advanced Railways/duly taking into consideration the research work carried out by UIC\*/ORE†."\*\*

19.2. Very little improvement has, however, been done in the structural design of points and crossings with the result that they continue to constitute the weakest link in the permanent way. The Committee, therefore, recommend that urgent action should be initiated by the Railways to develop improved designs which should not only be sturdy and easy to maintain but would also have higher speed potential. Turn-outs at the entry/exit of goods and passenger yards should have a speed potential of about 50 to 75 km/h and those at the junction of single and double line of 100 km/h.

19.3. For improved run on points and crossing elimination of rail joints is very necessary. The Railways should, therefore, go in a big way for welding of joints of lead and stock rails of the points and crossings.

19.4. The advantages of using cast manganese (CMS) crossings as compared to the conventional crossings are now well-established. The Committee, therefore, recommend that the Railways should speed up replace ment of conventional crossings by CMS crossings.

\* UIC = International Union of Railways.

† ORE = the office of Research and Experiment which has been set up by the UIC to undertake research and experimentation on Railway equipment.

\*\* Para 26 of the Report of the Committee of Chief Engineers, Directors and Additional Commissioner of Railways Safety (1971) on 'Review of BG track standards.'



## 20.0. Store workload of PWIs.

20.1. Custody and accounting of stores by PWIs not only claim a lot of their time but are also a cause of considerable anxiety to them and prevent them from giving undivided attention, energy and time to the maintenance of track, which is their principal job. The need for affording relief to the PWIs in the matter of stores, is therefore, urgent. Wanchoo Committee had recommended that PWIs should be relieved of their store charge and should be held responsible only for the imprest stores issued to and required to be used by them for their day-to-day work. While reviewing the action taken on Wanchoo Committee's recommendations, Sikri Committee, in 1978, had noted that in partial implementation of this recommendation, permanent way depots, one on each Division, have been set up on the Indian Railways. These permanent way depots, while being useful to a limited extent, have not relieved the permanent way inspectors of their store workload adequately. These Depots mainly serve as store houses of scrap materials which are sent by the PWIs; new materials are still being received direct by the PWIs and kept on their books. The ultimate accountability of stores, therefore, still devolves on the PWIs. We, therefore, endorse the suggestion of the Sikri Committee that permanent way depots each under the charge of a store keeper, should be set up one for each sub-division on the open line under the charge of an Assistant Engineer.

## 21.0. Working conditions.

21.1. The working conditions of track maintenance staff, particularly gangmen, keymen and mates, are arduous. These staff have often to perform their duties in inclement weather. They have to reside in gang huts, in block sections, which are located far away from habitations, and where no educational facilities, electricity or piped water supply exist. There have been cases when these gangmen, while working on the track, have got run over and killed by trains.

21.2. With changes in the socio-political conditions, the track maintenance staff naturally expect better living conditions, facilities for their children's education, etc. In the coming years it would become more and more difficult to expect these employees to perform their duties under such arduous conditions. It is, therefore, recommended that their working conditions should be improved.

21.3. As a first step in this direction, all future construction of gang huts should be arranged only at Railway stations, so that this category of staff, along with their colleagues in other disciplines can also enjoy the facilities of electricity, water supply and education for their children as may be available. To guard against being run over by trains while working on the track, some of the Railways abroad provide bright yellow coloured vests to their track maintenance staff. With these vests these employees are easily sighted by the drivers who then blow the whistle to warn them of the approaching trains. The Committee recommend that vests of bright yellow colour should be supplied to all gangmen, keymen and mates.

21.4. The Committee also recommend that there is need to modernize tools and plants of gangs. These tools should not be crude or clumsy, but should be designed on the principles of ergonomics, so that these are light and convenient for use.

## 22.0. Conclusions.

22.1. To cope with the steep increase in traffic density by the turn of the century, the permanent way will have to be considerably strengthened and modernised. Tracks both on the broad and metre gauges will need be uprated to the standards suggested in the foregoing paragraphs.

22.2. Ballast cushion existing on many of the trunk routes and main lines is far below the prescribed standards. The Railways will have to step up the procurement of ballast. This will require setting up facilities for mechanised production of ballast and haulage of ballast trains by diesel/electric locos instead of steam locos.

22.3. Maintenance and renewal of track particularly on the 30,000 kms. of BG and 3,000 kms. of MG high-density routes will have to be mechanised by the turn of the century.

22.4. Due to inadequate outlays in the past, arrears of track renewal have accumulated to an almost unmanageable magnitude. The Railways will have to step up the pace of track renewal substantially with a view to wiping out these arrears as early as possible. This would call for substantially higher outlays and strengthening of the existing track renewal organisation.



## CHAPTER II

### BRIDGES

#### 1.0. Introduction.

1.1. There were 1,12,254 bridges on Indian Railways as on 31 March 1981, varying in size from the largest—the Sone bridge more than 3 kms. long—to many tiny culverts. A large number of these bridges are 60 to 80 years old, and were constructed at the time of initial laying of the rail lines. These bridges were constructed to higher standards of loading then prevalent. Many of them were built in lime mortar and their sub-structures have now become weak. With the introduction of heavier axle loads and higher speeds, some of the bridges are not able to cope with the present loading standards and densities at the maximum speeds prescribed for these routes.

#### 2.0. Arrears.

2.1. **Distressed bridges.** A large number of bridges are in need of rebuilding, and have been classified as 'distressed'. On the basis of information furnished to the Committee by the General Managers of the Zonal Railways, the number of distressed bridges on 31 March 1981 was 2,214\*. Out of these, 202 bridges were having speed restrictions of varying magnitudes. For safe and smooth operations the urgency of keeping bridges in sound health cannot be over-emphasized. The Committee recommend that a programme for rebuilding of all distressed bridges within the next three years should be drawn up and implemented. The Railways should also devise improved methods for rebuilding of bridges which may avoid the need for imposing 'stop-dead' speed restrictions.

2.2 In the phasing of a priority for replacement of both major and minor bridges, the Railways will have to be very cautious. The first priority, of necessity will have to be given to those distressed bridges which are not only having speed restrictions, but which should 'from all considerations' be promptly replaced. This work should be included in the first phase and completed within the next twelve months. Subsequent phasing should be similarly worked out by the Railways with appropriate care.

2.3. **Bridges with 'early steel' girders.** There are about 2,700 bridges having 'early steel' girders, which were erected prior to 1905. The Committee have been told that because of a high content of sulphur and phosphorus in the 'early steel', these girders may become prone to brittle fracture leading to their sudden failure. There have been a few isolated cases of 'brittle fractures' bringing an element of uncertainty about the residual life of the girders in such bridges. The Committee appreciate that replacement of all the early steel girders within a short period may not be possible. It is, however, clearly necessary that a time-bound programme is drawn up to replace the early steel girders within the next four or five years. Till such girders are replaced they should be kept under observation. It is under-

stood that the quantity of steel required to replace these girders will be the order of 60,000 tonnes.

2.4. The requirement of funds for wiping out these arrears has been assessed to be about Rs. 75 crores.

#### 3.0. Finances for normal rebuilding.

3.1. The average annual allotment of funds for the last couple of years for rebuilding bridges has been in the range of Rs. 10 crores. Within this allotment, the rate of rebuilding is short of requirement. It has been assessed that the current replacement cost of all the bridges may be as high as Rs. 3,500 crores. Even on the assumption of average life of a bridge being 100 years, the annual requirement of funds for rebuilding of bridges comes to Rs. 35 crores. Funds for provision of road over/under-bridges in replacement of level crossings will be in addition to this requirement. The Committee, therefore, recommend that the annual outlay for rebuilding of bridges should be increased to Rs. 35 crores.

#### 4.0. Old bridges.

4.1. A large number of bridges would soon be completing their codal life.† Whereas rebuilding of bridges should not be necessary merely on the basis of their codal life, a critical study to assess the magnitude of the problem of rebuilding of such bridges is necessary. With the passage of time, as their condition deteriorates, many of these bridges may have to be rebuilt within a span of 10 to 20 years. Rebuilding of a large number of bridges in such a short period would be an impossible task. The Committee, therefore, recommend that the Railways should appoint an Expert Group consisting of Chief Engineers of a few Zonal Railways, a Director from Railway Board and another from RDSO and a Commissioner Railway Safety to conduct an in-depth study of the problem of rebuilding of old bridges. This Expert Group, after a scrutiny of the record of these bridges should assess the magnitude of the problem, and recommend a programme for rebuilding the old bridges.

#### 5.0. Bridges and higher trailing load.

5.1. There are proposals for introducing heavier freight trains of 4,500/7,500 tonne gross weight mainly on routes having high-density traffic. These trains would be run using BOX/BOXN wagons fitted with air brakes and would be hauled by multiple locos. As a result, bridges on the routes where these trains would ply would be subjected to much higher longitudinal forces. The Committee have been advised that investigations are currently in progress on some of the routes to assess the extent of strengthening/rebuilding of bridges needed on these routes. A preliminary examination made, has, however, shown that so long as the present maximum axle loads and loading density are not increased, massive rebuilding/strengthening of the existing bridges should not be necessary. The only precaution

\* Out of these about 20 percent are major and the remaining are minor bridges.

† Codal life of a bridge is 60 years for steel portion and 100 years for masonry portion.



required would be to ensure that when more than two locos are needed to haul these trains, they should be dispersed through the length of the train, so that not more than two locos are placed together. The Committee have been told that for hauling heavy freight trains, some of the railway system abroad already follow the practice of dispersing the locomotives along the length of the train. They utilise an arrangement known as 'locotrol' for this purpose. A similar arrangement would also need to be used on our Railways when more than two locomotives are needed to haul a freight train.

#### 6.0. Bridge Workshops.

6.1. Bridge Workshops have been set up on each Zonal Railway for fabrication of bridge girders, platform shelters and other steel works. In some of these workshops, casting of reinforced and prestressed concrete structure is also being undertaken. A large portion of the plant and machinery in these workshops are outdated, having exhausted their normal life, and sorely need replacement. Besides, modern equipment needed for taking up fabrication of welded girders, such as submerged arc welding equipment, radiographic testing equipment etc. are also required to be provided in these workshops. It is recommended that a programme of modernisation of the plant and machinery in the bridge workshops should be undertaken.

#### 7.0. Traffic Blocks.

7.1. Traffic blocks are needed not only for relaying of tracks, but also for mechanised, maintenance, rebuilding of bridges, etc. The present system of permitting traffic blocks is not related to the requirement of this work. Depending upon the running of trains, if some time-gap is available between two trains, traffic blocks are allowed to be imposed. The system results not only in the under-utilisation of track machines, but also in avoidable wastage of man-power and delay to track renewal and other essential works. It would be desirable if the availability of traffic blocks is brought much closer to need-based requirements and properly

coordinated. The traffic blocks of adequate duration should be taken into account in time-tabling and should be treated as much sacrosanct as the operations. If this is not done, various inescapable items of work mentioned above will remain unattended with serious consequences.

7.2. As traffic blocks will impinge on the line capacity requirements, extra cushion would have to be provided in advance while planning for line capacity. This factor is frequently overlooked.

7.3. Further, an in-depth study should be made by the Railways to optimise the use of track maintenance machines within the traffic blocks. If necessary, by temporary signalling arrangements, the Railways should be able to keep the traffic moving, while track is being attended to under the shadow of traffic blocks. There is need for much closer coordination between the Engineering, Signalling and Operating disciplines in planning and utilising the blocks.

#### 8.0. Conclusions.

8.1. The pace of replacement of distressed bridges needs to be accelerated. The aim should be to replace all the distressed bridges in the next three years.

8.2. There are about 2,700 bridges which still have girders of early steel. As these girders are prone to sudden failure due to brittle fractures, a programme to replace them on priority, should be drawn up and implemented.

8.3. To undertake the programme of replacing the distressed bridges and early steel girders, funds for bridge rebuilding will have to be stepped up to the level indicated in the foregoing paragraphs.

8.4. Availability of traffic blocks for rebuilding of bridges and other track renewal/maintenance works will have to be ensured.



## CHAPTER III

### LANDS

#### 1.0. Introduction.

1.1. Total land area available with the Indian Railways is about 3.42 lakh hectares, out of which about 2.2 lakh hectares is under Railway lines and other structures. Out of the balance, about 44,000 hectares have been given for 'grow more food scheme', while about 78,000 hectares are presently lying unused. These 78,000 hectares of land include both vacant lands along the railway track and lands in urban areas. The Railways are in possession of many big plots of vacant land in the metropolitan cities and other major towns. In Delhi alone the Railways have more than 40 hectares of land in the urban area, which is at present lying vacant. Similarly, the Railways have many chunks of valuable vacant land in the metropolitan areas of Bombay, Madras and Calcutta, and commercial cities like Ahmedabad, Bangalore, Hyderabad/Secunderabad, Lucknow, Kanpur and Jaipur.

1.2. The book value of the total lands owned by the Railways on 31 March, 1981 was estimated to be over Rs. 90 crores, the current cost of the lands is, however, many time higher.

1.3. Land is a scarce and valuable asset. Acquisition of land at present is not only difficult but also expensive. The Railways have been able to expand, because sufficient land was acquired by them at the time of the initial construction of lines and structures. The Railways, therefore, have to exercise good care to ensure that this land is kept free from encroachments.

#### 2.0. Encroachments.

2.1. At many places, particularly in big cities, substantial encroachments on these lands have taken place. What is more disconcerting is that the number of encroachments have been increasing in menacing proportions in recent years. This is clear from the statistics given in Table 3.1.

Table 3.1  
Encroachments on railway lands

Railway	Number of encroachments as on 31 March		
	1975	1978	1982
Central	11,308	13,061	20,095
Eastern	11,342	11,465	12,134
Northern	9,767	4,367	8,796
North Eastern	1,888	2,268	1,671
Northeast Frontier	16,323	19,001	17,523
Southern	2,668	3,086	3,531
South Central	3,409	3,877	5,059
South Eastern	4,628	7,211	8,040
Western	2,638	3,355	5,964
C.L.W.	132	140	675
<b>Total</b>	<b>64,103</b>	<b>67,831</b>	<b>83,488</b>

2.2. It is estimated that on 31 March 1982, railway lands with an aggregate area of 2,212 hectares were under encroachments.

2.3. Following are the main factors responsible for the growing encroachments on railway lands :

1. Absence of an effective land management organisation.
2. Lack of up-to-date land plans.
3. Encouragement and interference from pressure groups.
4. Lack of adequate co-operation of the State Police, including GRP and the Revenue officials in assisting Railway staff in removing the present encroachments and preventing further encroachments.
5. Absence of powers with the RPF to assist in casement of encroachments.
6. Extremely slow and ineffective process of eviction proceedings under the Public Premises Eviction Act.
7. Knowledge among the people about the helplessness of the Railway Administration in this matter.

2.4. With the increasing pressure of population, the number of encroachments on the vacant railway lands are only likely to increase. It is, therefore, essential that urgent action is initiated by the Railways to tackle the factors which have been responsible for the growing number of encroachments.

#### 3.0. Organisation.

3.1. The organisational set-up on the Railways for land management is ineffective and nearly non-existent. This is despite the fact that most of the railway land is along the track. As it happens bulk of it is unfenced. There is practically no land management organisation at the divisional level.

3.2. Land management has been the responsibility of the officials of the Civil Engineering Department. They are pre-occupied with their primary duty of maintaining track and other structures, and have little time for land-management work. Furthermore, land is a State subject, and after Independence a large number of laws governing the rights of tenants, lessees etc. have been passed by State Legislatures. With the plethora of laws and attendant rules and regulations framed thereunder by the State Governments, local bodies, etc., land management has become a complicated and specialised subject.

3.3. It has become wellnigh impossible for the officials of the Civil Engineering Department to manage the railway lands.



3.4. The Director General, Defence Lands and Cantonments, and the newly appointed Director, Land Management, Railway Board were called and discussions were held with them. These discussions revealed that for managing about 30,000 hectares of vacant lands, an organisation† comprising of DDL&C†† in each Command and generally an MEO\* in each Sub-Area, with supporting staff exist in the Defence Department. On the Railways, there is practically no organisation for managing 78,000 hectares of vacant land and 44,000 hectares of land given for 'grow more food scheme'. This is despite the fact that in the case of the Defence Department the vacant lands are mostly concentrated in compact areas whereas in the case of the Railways, bulk of the vacant lands are situated along the railway tracks which criss-cross the entire length and breadth of the country and at about 7,000 railway stations, many of which are located in major cities and towns.

3.5. These discussions also showed that in the absence of an adequate land management organisation, even the up-dated land records are not available with the Railways. At many places railway lands do not stand demarcated. The Railways are, therefore, not in a position to pursue in the Courts of Law several thousands of encroachments in their lands.

3.6. If the Railways are to prevent their land from going under encroachments, and to manage them properly and to use them effectively for augmenting their resources, their land management organisation will have to be considerably strengthened. Our recommendation in this regard is the setting up of a Railway Land Development Authority under a Statute, details of which are spelt out in the succeeding paragraphs.

#### 4.0. Land licensed under 'grow more food scheme'.

4.1. Large areas of railway lands in station yards as also in between the railway stations have been licensed under the 'Grow More Food Scheme'. Licensing of lands for this purpose has been in vogue for the last 25/30 years. Till 1967 the policy was to license lands in the stations yards to railway employees and the lands along the railway track in between the railway stations to outsiders or to the State Governments. It has roughly been estimated that out of the 44,000 hectares of land licensed under this scheme, about 20,000 hectares are with railway employees, about 17,000 hectares with State Governments and the balance, about 7,000 hectares, with outsiders.

4.2. As for the lands given to the State Governments, they were required to license them to individuals for cultivation purposes, fix and recover the necessary licence fees from them, retain 10 percent of the earnings and pay the balance 90 percent to the Railways. The Committee has been informed that the State Governments did not generally reimburse the Railways with the earnings from the lands given to them. In fact, the State Governments did not even furnish to the Railways the requisite information about the dues collected by them by licensing the railways lands to individuals. The Railways themselves also do not appear to have taken any serious steps to follow this up.

4.3. So far as land licensed for cultivation direct by the Railways is concerned, till 1976 the policy was to carve out large and compact plots and license them to

the highest bidders in auctions. In 1976 this policy was revised by the Railway Board and following instructions\*\* were issued :

1. Vacant lands in between the railway stations should be licensed to outsiders belonging to scheduled castes/scheduled tribes, backward classes and other landless poor. While allotting these lands, applications of the railway employees belonging to these categories can also be considered, provided that this does not detract their attention from normal duties.
2. Vacant lands in station areas and colonies should be licensed to the railway employees belonging only to the scheduled castes/scheduled tribes and to other landless poor. In case employees belonging to these categories are not forthcoming, lands can be allotted to the other railway employees, the objective, however being that by and large the intersets of the low paid Class IV and Class III employees of the Railways were to be properly safeguarded.
3. Where there are large and compact plots of railway lands these may be divided into plots of two acres or so and may be licensed as per above instructions without conducting any auctions.

4.4. According to the earlier policy, mostly large plots of railway lands were licensed, and consequently the number of agreements with licensees were not many. With the revised policy, land was divided in plots of two acres or so and licensed to individuals. This involved the Railway Administration in dealing with a very large number of individuals, demarcating the plots at sit for them and entering into agreements with them for recovery of the licence fees. This involved considerable extra load of detailed work.

4.5. As the Railway Administration has no machinery of their own to verify whether a particular applicant belongs to the scheduled castes/scheduled tribes or is a landless poor, they had to depend upon the local authorities to furnish certificates to the individual applicants to this effect. This led to a large number of representations in connection with the licensing of lands. Attending to the representations threw further burden on the officials of the Civil Engineering Department. In fact many deviations came to notice from the prescribed rules. Not only that licence fees could not be recovered in many cases, maintenance of tracks and structures also suffered.

4.6. The policy decision to utilise vacant lands for cultivation was taken at a time when there was acute food shortage in the country. The rules for licensing of land for this purpose were framed only to increase food production. The annual earnings from 44,000 hectares are only about Rs. 37 lakhs, i.e. even less than Rs. one hundred per hectare. Today conditions are vastly different and the food situation has considerably improved, with the result that emphasis is now on growing more foodgrains per hectare of land rather than on bringing more land areas under the plough. We, therefore, recommend that railway lands given to the State Governments and the individuals under the 'Grow More Food Scheme' should be taken back at the expiry of the currency of the present licences and utilised for afforestation.

† This organisation is also responsible for acquisition of lands and hiring of lands and buildings for the Defence Services as well as for the operation of Urban and Land Ceiling Act in cantonment areas.

†† Director, Defence Lands and Cantonments.

\* Military Estate Officer. There are a few Sub-areas which do not have MEO while some of the MEOs are also located at places other than the Sub-Areas.

\*\* Railway Board's letter No. 75/W2/16-78, dated 6 May, 1977 addressed to the General Managers.



## 5.0. Afforestation.

5.1. The environmental and ecological balance of the Indian subcontinent have through the ages rested on the mountains and the forests. Over the years there had been extensive denudation which has greatly disturbed this balance. To the extent the Railways can contribute to its restoration, they will not only subserve a national cause but will also find a very effective use for their vacant lands. While on the vacant lands at railway stations and in colonies shady and ornamental trees should be planted, trees which yield timber and fuel should be planted on the land along the railway tracks. An extract from the Report of the recent Railway Delegations to China in this regard is relevant.

"Planting of different species of trees all over the country, taken up on a massive scale during the past 10 to 15 years, provides a fascinating sight while travelling through China by road, rail or air. All spare land alongside roads and railway tracks is almost fully covered by plantation and has helped them improve the landscape and transform vast arid wastes into green belts."

5.2. The Committee understand that the Railways have recently drawn up a programme to plant ten crores trees on the vacant railway lands along the track as well as at stations and in colonies during the coming years. While about one crore trees to be planted in railway colonies and at railway stations are proposed to be planted by the Railways themselves, the work of planting about nine crore trees along the railway track is proposed to be entrusted to the State Forest Department.

5.3. The Committee hope that the Railways with the co-operation of the State Forest Departments would be able to achieve the target and that there would be an effective system of monitoring the progress, as well as the income drawn from this scheme. Care will have to be taken to see that the selection of trees and their siting are such that they would not interfere with the clear view of the track by the loco drivers. Furthermore, it is not only sufficient to plant trees : they should be cared for, protected and recorded under a well-knit system. This step can also help in providing timber for sleeper to the Railways in the decades to come for their own use. Even though there may not be immediate income from the plantation of trees, the strategy is considered necessary in the overall national interest to improve the ecology and environment and beauty of the areas through which the railway passenger travel of whom there are one crore every day.

## 6.0. Licensing of land for commercial purposes.

6.1. The Railways have also been licensing a small portion\* of their vacant land for commercial activities such as stacking of materials transported by them, setting up of cycle or taxi stands, bulk oil installations, shops etc. The present annual income from this source is about Rs. four crores. For such licensing, the Railways have normally been charging a minimum annual licence free equivalent to six per cent of the market value of land as assessed by the local revenue authorities. The Committee consider that in the present context, these annual charges of six percent are very low, and recommend that these should be raised to 10-12 per cent or licensing of such plots of land should be done through auctions with a view to getting the maximum revenue out of them. The latter would on the whole be more straightforward and would also be more equitable and in line with the policy adopted by urban development authorities.

## 7.0. Railway Land Development Authority.

7.1. In spite of the vast land assets owned by the Indian Railways, commercial utilisation of vacant lands and air-space over the railway tracks in urban areas has been insignificant. This is despite the fact that the Railways own some of the best located lands in metropolitan cities and commercially important towns.

7.2. The Railways in foreign countries exploit their vacant lands in urban areas for mobilising resources for their developmental activities. It is understood that skyscrapers have been put up by many Railways abroad, for instance in USA, Canada and Japan. Indian Railways should also put their surplus lands in urban areas to similar commercial use by constructing multi-storied structures, and in other ways.

7.3. The Committee have been advised that one or two proposals in this regard were framed by the Railways in the past. One such proposal was for the construction of a skyscraper at Marine Line station in Bombay on the Western Railway, the first three floors of the proposed skyscraper were to provide the accommodation for the station proper. Above these floors there were to be 25 additional storeys to be let out for commercial purposes. This proposal, which was expected to yield a return of 10 per cent, was, however, not progressed. As advised by the Railway Board and by the Western Railway, a similar proposal at Bombay Central station has been framed and is presently being processed.

7.4. The only practical solution to the malady of increasing encroachments is the early utilisation of such valuable land, particularly in the urban areas, to the best advantage of the Railways. As for the existing encroachments, the Railways should vigorously pursue the cases for their eviction with the courts.

7.5. Clearly the land management organisation on the Railways needs to be considerably strengthened. Land Management Cells should be set up at the Divisional as well as Zonal headquarters. At the apex, there should be a Railway Land Development Authority (RLDA) which would operate through these land cells at Zonal and Divisional headquarters. In other words, the overall legal and jurisdictional authority will now vest in the RLDA. To be precise it is the management of the land and the utilization thereof that will vest in this Authority, and in the network on the Railway system under it, and not the ownership of such land. The ownership will continue to be with the Railways.

To begin with, the Land Management Cell at the Zonal headquarter should have one Land Control Officer (senior scale), assisted by an Inspector (Land) and an Inspector (Afforestation), in grade Rs. 840-1040. At the Divisional headquarter the Land Management Cell should comprise an officer for Land Management (senior scale), assisted by an Inspector (Land) and an Inspector (Afforestation) in grade Rs. 700-900.

7.6. What the Committee are recommending is the setting up of an Authority which should be similar to the Delhi Development Authority (DDA), the Calcutta Metropolitan Development Authority (CMDA) and the Bombay Metropolitan Regional Development Authority (BMRDA). An Authority has been recommended in preference to a Corporation as the latter will not have the requisite legal and jurisdictional authorities.

\* About 3 percent of the total lands available with the Railways.



7.7. The Authority should also be responsible for managing and using the valuable land in metropolitan and commercial cities and towns by building multi-storeyed buildings and skyscrapers for commercial usage and other revenue earning activities.

#### 8.0. Conclusions.

8.1. The Railways should take to afforestation in a big way on their vacant lands especially alongside the track and in the colonies to prevent encroachments as well as to improve environment and ecology. Towards this end, vacant lands given by the Railways to the State Governments and individuals for grow more food campaign should be taken back and utilised for planting trees.

8.2. In the absence of an effective land management machinery, considerable tracts of railway land have already suffered encroachments. The land management organisation on the Railways would to be considerably strengthened to prevent and remove encroachments and promote proper utilization. In this connection, a Railway Land Development Authority should be set up to spearhead a strengthened land-management network.

8.3. The Railways have considerable areas of vacant land in the metropolitan cities and other commercial towns. With the setting up of the Land Development Authority, the Railways should be able to exploit such valuable lands as well as the air-space, where feasible, for mobilisation of additional resources by, *inter alia*, raising skyscrapers on such land for commercial use.





## CHAPTER IV

### SUMMARY OF RECOMMENDATIONS

#### Chapter I

#### Track

1. On Group D broad gauge routes where speeds are expected to go up to 100 Km./h, 52 kg./m rails should be used instead of 44.64 kg./m rails even if the traffic density on these routes is less than 100 GMT per annum.

No future primary renewals even on Group E of broad gauge routes should be done with rail sections less than 52 kg/m.

(Para 6.1)

2. On the metre gauge the minimum rail section to be used should be 37.2 kg/m (75 lb/yard). On the 13 MG routes already specified by the Board, 44.64 kg/m (90 lb/yard) rail section should continue to be used.

(Para 6.2)

3. Government should ensure that in future only wear resistant rails which have ultimate tensile strength (UTS) of 90 kg/mm sq. are manufactured instead of the present medium manganese rails which have a UTS of only 72 kg/mm sq.

(Para 6.3)

4. Sleeper density should be raised to 1,660 Nos. per kilometre on such of Groups A,B,C, and D BG routes as have traffic density in excess of 10 GMT per annum. When the traffic density is less than 10 GMT per annum on these routes, the sleeper density should be 1,540 Nos. per kilometres.

(Para 7.1)

5. Railways should step up the production capacity of concrete sleepers to about 3.0 million per year by 1984. This would enable the Railways to provide by the turn of the century, concrete sleepers on 30,000 kms. of BG and 3,000 kms. of MG track which are the heavily used sections.

(Para 7.5.)

6. To encourage the Industry to set up facilities for developing and manufacturing improved types of track fittings, supply orders should be for periods of five years after full production is established on the accepted schedule.

(Para 8.3)

7. Ballast cushion even on some of the trunk routes/main lines is less than the prescribed standards. Urgent action should be taken by the Railways to increase the depth of ballast cushion to these standards.

(Para 9.2)

8. Whenever the percentage of clean ballast cushion in a stretch of track falls below 35 per cent complete re-ballasting of the track should be carried out.

(Para 9.3)

9. Procurement of ballast for recouping wastage due to attrition, track renewals and to bring up the ballast cushion to the prescribed standards, should be raised to

6.5 million cubic metres per annum. At current prices, provision of funds for this level of ballast procurement should be Rs. 65 crores per annum.

(Paras 10.2 & 10.3)

10. For augmenting the availability of ballast, not only the number of ballast quarries need to be increased but production and loading of ballast should also be mechanised.

(Para 10.4)

11. To encourage contractors to make investments on plant and machinery for mechanisation of ballast quarries, it would be desirable to increase the period of ballast contracts to at least five years.

One or two departmental mechanised quarries should be set up on each Zonal Railway.

(Paras 10.5 & 10.6)

12. To enable adequate training out of ballast, ballast trains should be run with diesel/electric locos and adequate number of hopper wagons should be made available for running of ballast trains.

(Para 10.7)

13. Mounting backlog of track renewal is not only leading to increased maintenance cost but also affecting the safety and smooth movement of traffic. During the last 14 years alone the annual number of rail fractures has increased more than four times and the length of track under speed restrictions has increased about three times. To overcome the above problems and also to increase the availability of second-hand materials to upgrade track on branch lines for plying of heavy axle locos, primary track renewals have to be accelerated.

13.1. To enable the heavy backlog of track renewals to be cleared, the annual outlay for track renewals should be increased to Rs. 430 crores till the arrears are wiped out. Thereafter, requirement of renewals would come down to cater to current arisings of an estimated 2,300 kms. of primary and 900 kms. of secondary renewals.

(Paras 12.1, 12.2, 12.3, 12.4 & 12.5)

14. On branch lines and routes where traffic density is not heavy, manual methods of track renewal could continue. On heavy density track routes/main lines where modern track structure with concrete sleepers have to be laid, mechanisation of track renewal would be necessary.

(Para 13.1 & 13.2)

15. Existing track renewal organisation on the Railways is inadequate both in strength and equipment to undertake renewals on the suggested scale viz., 3,300 kms. of primary and 1,500 kms. of secondary renewals every year. The existing organisation particularly at the field level should be considerably strengthened to undertake track renewal at this suggested scale.

(Para 13.4)



16. Additional 24 sets of equipment for mechanised track renewal alongwith matching number of tamping machines should be procured by the Railways.

(Para 13.5)

17. By 2000 A.D., about 30,000 kms. of track on BG and 3,000 kms. of track on MG should be provided with modern track having concrete sleepers. On this kilometrage of track also, mechanised maintenance should be introduced.

(Para 14.2)

18. Holding of track machines for mechanised maintenance should be raised in a phased manner to 220 Nos. by 2000 A.D. Adequate facilities for periodical overhaul (POH) of these machines by setting up three shops one each at Allahabad, Secunderabad and Manmad, should be created.

(Paras 15.1, 15.2 & 15.3)

19. There should be direct recruitment for 50 per cent of the vacancies in the cadre of permanent way mistries.

(Para 16.1)

20. In view of the suggested mechanisation of track maintenance of 33,000 kms. of heavy density routes, the existing gang strength for maintenance of 1,64,200 men should not be augmented any further. On the other hand, to synchronise with the introduction of mechanised maintenance this strength should be gradually reduced through normal wastage to the standard suggested by the Special Committee on gang strength.

(Para 16.4)

21. On those sections where mechanised maintenance is introduced, two or three adjoining gangs should be merged and converted into a mobile gang with enlarged beat and provided with rail-cum-road transport.

(Para 16.5)

22. Yard maintenance should be improved by upgrading the track structure of yard lines to the standard, of running lines and by improving the drainage of yards. At important stations washable aprons should be provided on busy passenger platform lines. Yard lines should be made available for maintenance on the basis of planned schedules.

(Para 16.6)

23. By 2000 A.D., 30,000 kms. of BG and 3,000 kms. of MG routes having high density traffic should be provided with LWR/CWR. Remaining track kilometrage should also be provided with short welded panels in the near future. Welding of (rails) in major classification yards should also be completed by the Seventh Plan.

(Paras 17.4 & 17.5)

24. Ultrasonic rail flaw detectors should be provided with recording arrangements. To speed up the work of ultrasonically testing the rails, nine nos. of ultrasonic rail flaw detection cars should be imported by the Railways.

(Paras 18.2 & 18.3)

25. The Railways should develop improved designs of points and crossings, which should not only be sturdy and easy to maintain but should also have higher speed potential. Welding of lead and stock rails on points and crossings replacement of conventional crossings by CMS crossings should be accelerated.

(Paras 19.2, 19.3 & 19.4)

26. In Order to reduce the store workload of the PWIs, permanent way depots under the charge of a store keeper should be set up, one for each sub-division.

(Para 20.1)

27. Working conditions of gang men, keymen and mates should be improved. All future constructions of ganghuts should only be at Stations. The gangmen, keymen and mates should be provided with bright yellow coloured vests to enable them to be sighted easily while working on the track. The gang tools should be designed on the principles of ergonomics so that they are light and convenient for use.

(Paras 21.3 & 21.4)

## Chapter II

### Bridges

28. All the 2,214 existing 'distressed' bridges should be replaced in the next three years.

(Para 2.1)

29. All the 'early steel' girders on 2,700 bridges should be replaced in the next four to five years.

(Para 2.3)

30. Average annual allotment of funds for rebuilding of bridges should be increased to Rs. 35 crores.

(Para 3.1)

31. To assess the magnitude of the problem and to recommend a programme for rebuilding of the old bridges, a special group consisting of Chief Engineers, Directors and Commissioner of Railway Safety should be set up.

(Para 4.1)

32. If the present axle loads and loading density are not increased, massive rebuilding/strengthening of the existing bridges for running of 4,500/7,500 tonne trains may not be necessary. If more than two locos are needed to haul these trains, these will have to be dispersed in the trains so that not more than two locos are placed together.

(Para 5.1)

33. A programme of modernisation of bridge workshops should be undertaken.

(Para 6.1)

34. Traffic blocks of adequate duration should be inbuilt in time-tables for re-laying of tracks, mechanised maintenance, and rebuilding of bridges. Traffic blocks should be treated as sacrosanct as train operations.

(Para 7.1)

## Chapter III

### Lands

35. The Railways, vacant lands given to the State Governments and individuals for grow more food campaigns should be taken back at the expiry of the currency of the present licences and utilised for afforestation.

(Para 4.6)



36. On the vacant lands along the railway track and colonies tree plantation in a big way should be undertaken. While afforestation at stations and colonies will be done by the Railways, that along the Railway track will be undertaken by the State Forest Departments.

(Paras 5.1 & 5.2)

37. The minimum annual licence fee for railway lands licensed for commercial purposes, should be raised to 10-12 per cent of the market value of the land or preferably it should be determined through open auction.

(Para 6.1)

38. To prevent encroachments on railway land and to augment Railways resources, the existing land management organisation should be considerably strengthened. This will be spearheaded by a Railway Land Development Authority (RLDA), which will operate through Land Management Cells to be set up at the Divisional and Zonal Headquarters.

(Para 7.5)

39. The Authority should also commence exploitation and managing of the valuable land in metropolitan and commercial cities and towns by building multi-storeyed buildings and skyscrapers for commercial uses and other revenue earning activities. (Para 7.7)

Sd./-  
Prof. Ravi J. Matthai

Sd./-  
V.C. Sawheny

Sd./-  
Russi Mody

Sd./-  
M. Satyapal

Sd./-  
Justice H.C.P. Tripathi

Sd./-  
H.C. Sarin (Chairman)

Sd./-  
Dr. S.K. Ray (Secretary)

25 October, 1982.







सत्यमेव जयते

भारत सरकार Government of India  
रेल मंत्रालय Ministry of Railways

**REPORT**  
**OF**  
**'THE RAILWAY REFORMS COMMITTEE**

सत्यमेव जयते

**Part IV**

**RAILWAY RESERVE FUNDS**

**NOVEMBER, 1982**



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## INTRODUCTION

The Committee have so far submitted three Reports to the Government. In the first Report, renewal and replacement of overaged track and rolling stock, and issues pertinent to safety and accident-prevention were dealt with. These were matters which the Committee thought were such as needed to be brought to the notice of the Government for immediate action. We have thereafter submitted a Report on TRANSPORTATION which in fact is the first in the series of our long-range perspective Reports. We have also submitted a Report on RAILWAY TRACK, BRIDGES & LANDS.

In the course investigations and deliberations, it was becoming increasingly manifest that a number of important aspects relating to Reserve Funds on the Railways needed to be studied in-depth, specially in relation to their scope, appropriation and utilisation.

It was also considered that these were matters which were relevant not only in the context of timely renewal,

replacement and rehabilitation of the vital railway assets, but also with reference to some important aspects of development financing, transport pricing and pensionary liabilities. These are the issues which, inter alia, have been covered in this Part of the Report.

The Committee have made a number of recommendations in respect of the Depreciation Reserve Fund, the Development Fund, the Pension Fund and the Accident Compensation, Safety & Passenger Amenities Fund.

It is considered essential for the Railways to implement these recommendations, so that the appropriations to these Funds, as also their administration and deployment, are undertaken realistically, and a true picture of railway finances is projected to the public.

We are making these recommendations also in time to enable the Railways to take them into account while preparing the Revised Estimates for 1982-83 and the budget Estimates for 1983-84.





# CHAPTER I

## DEPRECIATION RESERVE FUND

### 1.0. Introduction.

1.1. The maintenance and development of the Railways is vital to the national as also sectoral economic development of the country. With an investment of Rs. 7,000 crores, the Railways have more than one lakh kilometres of track and a fleet of rolling stock comprising about 11,000 locomotives, 4 lakh wagons\* and 38,000 coaches. The value of assets at the current cost of replacement is in the region of Rs. 37,000 crores. In order that a vast undertaking of such dimension continues to play the assigned role, its assets would require to be maintained at an optimum level of productivity.

1.2. The Railways have not maintained their assets at a satisfactory level. The arrears in track renewal have built up over the years to such an extent that without accelerated renewal, 20 percent of the total track would be sick by the end of the Sixth Five Year Plan. In addition, a large number of over-aged wagons, coaches, and machinery and plant require to be urgently replaced. The situation is so serious that it brooks no delay and calls for a high priority remedial strategy.

1.3. It is a basic duty of the Railways to keep their 'Capital' intact. For this purpose 'Capital' does not signify the investments but the physical facilities that it has created. The mistakes of the past should not be perpetuated, and the serious situation in which the Railways find themselves today requires to be retrieved. There should be an objective and scientific basis for determining the amount to be set aside from the Revenues for carrying out renewals and replacement. The basis to be adopted must necessarily provide for inflationary conditions, obsolescence, technological advancements and possible changes in the life of the assets.

### 2.0. Historical background.

2.1. During the First World War, the Railways could not carry out the renewal of their important assets like the permanent way and rolling stock, as they did not maintain any reserve fund to ensure that adequate finances were readily available to carry out the requisite renewal. Various bodies like the Acworth Committee, 1921, and the Inchcape Committee, 1923 went into this question and recommended the creation of a Deprecia-

tion Reserve Fund (DRF). These committees† stressed the need for the Railways to make adequate annual provision for maintenance and renewal of their assets. They recommended that the amount of depreciation should be debited to the working expenses and kept in a regular Fund. This Fund could be drawn upon to meet the requirements as they arise, or used when the materials were available so as to avoid situations like the one the Railways had to face after the First World War.

2.2. In the light of the recommendations made by these Committees, the system of having a Programme Revenue + voted from year to year was abolished from 1 April, 1924 and a regular Depreciation Reserve Fund was created as part of the implementation of the proposals relating to the separation of Railway Finances from the General Finances. The annual contribution to the Fund was on a straight-line method, i.e. the original capital cost of the assets divided by the number of years of their estimated useful life. On replacement, the cost of the new asset was debited to Capital. The original cost was credited to Capital by debit to DRF.

2.3. The scope of DRF and the method of working out annual contributions to DRF have undergone a number of changes ever since the Fund was constituted. Two of the important changes were the following :

1. DRF which originally was intended to accumulate only the original cost of the asset was virtually converted into a Renewal Reserve Fund, which bore the entire cost of renewal, inclusive of inflationary and improvement elements.
2. The elaborate system of keeping detailed asset registers and working out contributions to DRF meticulously based on the life of wasting assets was discontinued after 1935.

2.4. Table 1.1 gives the picture in brief. It is seen from this Table that a part from the two basic changes indicated in para 2.3, the value of materials released as a result of renewal/replacement came to be credited to DRF instead of to Revenue from 1 April, 1936. Similarly the interest on the Fund balance which used to be appropriated to Revenue earlier came to be credited to DRF from 1 April, 1950.

Table 1.1  
Changes in rules of allocation

Period	Allocation of replacement expenditure			Method used for assessing depreciation provision	Head of account to which interest on depreciation fund balance was credited	Head of account to which value of released material was credited
	Original cost	Increase over the original cost	Cost of improvement over original asset			
1	2	3	4	5	6	7
1 April, 1924 to 31 March 1935.	DRF	Capital	Capital	Straight line, based on life of each asset.	Revenue	Revenue
1 April, 1935 to 31 March 1936.	DRF	Capital	Capital	1/60th of Capital at-charge of all assets.	Revenue	Revenue
1 April, 1936 to 31 March 1950.	DRF	DRF	Capital	-do-	Revenue	DRF
1 April, 1950 to date	DRF	DRF	DRF	As recommended by the Coven- tion Committee. (Cf. para 2.5).	DRF	DRF

\* Equivalent number in 4-wheelers is 5.4 lakhs.

† Some important observations made by these Committees relevant in the present context are given in Annexure A-1.1,

+ This included that part of the cost of renewal and replacement as was chargeable to Revenue. The amount was voted from year to year and whatever portion was not spent within the year lapsed.



2.5. From 1 April, 1950 the proposals about appropriations to be made to DRF are sent by the Ministry of Railways to the Railway Convention Committee (RCC). These recommendations have thereupon been generally approved by RCC and passed by the Parliament.

### 3.0. Fund Balance.

3.1. DRF is expected to have a balance of Rs. 142.3 crores on 31 March, 1983. This is shown in Table 1.2.

Table 1.2.

DRF Balance	(Rupees in crores)
1. Opening balance as on 1 April, 1982.	152.70
2. Contributions during 1982-83, as budgeted	
(i) from Revenues	500.00
(ii) from the three Production units, viz., CLW, DLW & ICF.	3.31*
3. Interest on Fund balance	9.29
4. Budget withdrawal during 1982-83	523.00
5. Closing balance (1)+(2)+(3)-(4)	142.30

3.2. The amount in the Fund together with the interest thereon remains in deposit with the Central Government.

### 4.0. Views of Expert Bodies : A scrutiny.

4.1. The issue of appropriation to DRF was examined by a Group of Experts appointed in pursuance of the recommendations of RCC, 1971 and lately by RTEC, 1980.\* The findings of these bodies are discussed hereafter

4.2. Expert Group on Depreciation, 1975.—RCC, 1971, was concerned about a large number of overaged assets getting accumulated in the railway systems. The Committee wanted the Ministry of Railways to refine the technique of assessing the depreciation requirement and suggested that a Group of Experts drawn from Finance, Audit and technical disciplines should examine the problem in all its aspects. In pursuance of these recommendations, an Expert Group was appointed in 1973. The Group submitted its Report in 1975.

4.3. Adoption of one of two alternative methods was recommended :

4.4. Alternative 1.—Calculating depreciation based on the available data on wasting railway assets contained in the Block Account\* and working out separately the provision on account of :

1. Original cost assets
2. Inflation
3. Improvement element.

4.4.1. As the preparation of the Block Account started only with effect from 1 April, 1950, 1950-51 was

taken as the base year. The expenditure incurred on the creation of assets during each year from 1951-52 to 1972-73 was discounted by the composite index of prices/wages to bring it on par with the base year. In this way, the cumulative inflationary content was segregated. As regards the cumulative improvement content, the expenditure was separately available in the Block Account. From the total value of the Block assets, the inflationary and the improvement contents were deducted to arrive at the notional original cost of the assets, had these been created in 1950-51.

4.4.2. The depreciation provision to be made on the national original cost was calculated by the straightline method for each category of assets depending upon life-expectancy of the relevant category. The inflationary and the improvement contents already segregated from the Block value of assets were expressed as annual percentages of the latter, and the provision for depreciation made for improvement and inflationary contents. This way the Expert Group work out an annual figure of Rs. 131.6 crores made up of :

1. Rs. 63 crores representing depreciation on notional original cost.
2. Rs. 57 crores representing the inflationary content.
3. Rs. 11.6 crores for the improvement content.

4.4.3. The figure of Rs. 131.6 crores was then multiplied by 5 to arrive at a figure of Rs. 658 crores to be provided for the quinquennium 1974-79.

4.5. Alternative 2.—Calculating of depreciation based on the available data of Railways' wasting assets, estimating their current replacement costs and arriving at the provision for DRF. As per this alternative, the annual requirements of DRF came to Rs. 150 crores i.e. Rs. 750 crores for the five year period, as against Rs. 658 crores computed under Alternative 1.

4.6. The Ministry of Railways accepted Alternative 1, stating that it came closest to the objective expressed by RCC 1971, and that it rationally broke up the contribution into depreciation proper, inflationary element and the cost of improvement.

4.7. The Committee have examined both these alternatives. The Block Account does record only the original value of the assets purchased from time to time, except that it also includes improvement element of the assets replaced at the cost of DRF. Therefore, if the Block Account is taken to be the base, as has been done under Alternative 1, the inflationary element cannot be fully provided for. Besides the improvement component which has to reckon with the latest technological advances will be under played in such an approach. The amount of depreciation assessed by the Expert Group did not also take into account the backlog. Moreover, since the figure of Rs. 650 crores was based on the value of assets given in the Block Account up to the year 1972-73, it needed to be updated before making it applicable for a subsequent period, viz., 1974-79. This was not done. The decision to adopt Alternative 1 has thus materially affected renewals and replacements against the mounting requirements.

\* This is the contribution to DRF on the assets of the production Units and is a charge to the cost of production.

@ The rate of interest for 1982-83 is 6.6 per cent.

† Rail Tariff Enquiry Committee 1980.

\*\* The preparation of the Block Account started with effect from

1 April 1950 to give the value of physical assets, whether financed from loan capital or revenue. The Block Account record the original value of assets financed from Capital, Development Fund, Accident Compensation, Safety & Passenger Amenities Fund, Open Line Works Revenue, as also the improvement element of the assets replaced at the cost of DRF.



4.8. Alternative 2, even though more appropriate, also did not take into account the backlog and the improvement element.\* Coming to the present time, current prices would require a material change even under Alternative 2. Comparison of the prices adopted by the Expert Group with the current prices is indicated in Table 1.3.

Table 1.3

## Comparison of Prices

Type of asset	Prices adopted by the Expert Group†	Current prices
	Rs.	Rs.
Wagon (4-wheeler)	22,000	1.6 lakhs
Diesel locos	27.5 lakhs	70.0 lakhs
Rail per tonne	1,100	3,850

4.9. Further more, the life of rails has been theoretically taken as 60 years, though it should be around 30 years. In conclusion, the position has now changed significantly to justify a review. In fact the Expert Group had also recommended that a review should be carried out during the middle of the Fifth Five Year Plan in case the same was warranted by the rate of inflation, but in any case after five years. No such review has so far been undertaken.

## 5.0. RTEC, 1980.

5.1. RTEC had recommended that an Expert Committee should go into the whole question, so that a long-term policy decision could be arrived at on a more scientific and acceptable basis. For the interregnum, they recommended that annual appropriation to DRF should be made at 4.7 per cent on the value of assets shown in the Block Account. A similar rate was prevalent on the British and Canadian Railways. According to RTEC, this would enable the Railways to make the minimum (adequate) provision required for need-based replacement, and also take care of the arrears to some extent.

5.2. The proportion of depreciation to net fixed assets allowed by well-known railroads abroad varies from 3.3 per cent to 13.7 per cent.§ The proportions observed in respect of these Railways are given in Table 1.4.

\* In working out the replacement cost, the Expert Group considered replacement of 'like by like' assets, thus ignoring the improvement element.

† The prices adopted by the Expert Group are reported to be the latest published prices available to them and not the prices

Table 1.4

## Depreciation on Foreign Railways

Name of the Railway	Percentage of depreciation to net fixed assets.
1. French National Railway Company	13.7
2. Italian State Railways	6.0
3. Swiss Federal Railways	5.9
4. Japanese National Railways	5.6
5. British Railways	4.7
6. Canadian National Railways	4.7
7. American Rail Roads	3.4
8. German Federal Railways	3.3

5.3. The range-3.3 per cent to 13.7 per cent-is too wide to be a useful guide. The conditions on the Railways abroad are quite different from those on our system. Even their rules of allocation are different. For instance, on the Canadian National Railways (taken as a model by RTEC), the basis of charging depreciation is the original cost.‡ But no separate provision is made for inflation, and the excess of replacement cost over the original cost is charged to Capital. This is not so with us where the entire cost of replacement covering the original cost, the inflationary element and the improvement element is charged to DRF. It would, therefore, not be appropriate to apply the percentage of a Foreign Railway to the Indian Railways.

## 6.0. Analysis of the problem.

6.1. Every year, a certain amount is set aside from the Railway's own revenues and credited to DRF. The appropriation to DRF till the beginning of the Sixth Five Year Plan was about 3 per cent of the original value of the assets. Table 1.5 (page 166) gives the picture.

6.2. There are many categories of assets on the Railways, each with a different span of life. In the past, depreciation on these assets has been provided for at about 3 per cent of the original cost (of. Table 1.5 on page 166). That this depreciation was inadequate to requirement, and that depreciation should have been provided for at the rate of 2.6 per cent of the full replacement cost (as distinct from original cost) has been analysed in-depth by us in para 9.2. The past provisions

current at the time the Expert Group submitted their Report.

§ Page 15, Volume I of RTEC's Main Report.

‡ Position ascertained by the Expert Group on Depreciation which submitted their Report in 1975.



for depreciation have, therefore, broadly covered only, the original cost with no arrangement for the inflationary and improvement elements. Thus inflation which occurred during the life-span of the assets has not been neutralised by the Railways.

Table 1.5

## DRF : appropriation and withdrawal

Year	Capital at charge†† (Rupees in crores)	Appropriation to DRF from Revenue (Rupees in crores)	Percentage of appropriation to Capital-at-charge (3-2 × 100)	Net budgetary surplus (+) deficit (-) (Rupees in crores)
1	2	3	4	5
1960-61	1,520.0	45.00	2.96	(+) 32.01
1961-62	1,683.0	65.00	3.86	(+) 24.40
1962-63	1,896.8	67.00	3.53	(+) 42.06
1963-64	2,159.6	80.00	3.74	(+) 49.24
1964-65	2,435.1	83.00	3.41	(+) 13.18
1965-66	2,680.3	85.00	3.17	(+) 18.56
1966-67	2,841.6	100.00	3.51	(-) 18.27
1967-68	2,978.0	95.00	3.19	(-) 31.53
1968-69	3,101.3	95.00	3.05	(-) 7.86
1969-70	3,195.5	95.00	2.97	(-) 9.83
1970-71	3,330.3	100.00	3.00	(-) 19.84
1971-72	3,519.4	105.00	2.98	(+) 17.84
1972-73	3,726.0	110.00	2.95	(+) 2.92
1973-74	3,893.4	115.00	2.95	(-) 115.51
1974-75	4,105.6	115.00	2.80	(-) 113.82
1975-76	4,354.8	115.00	2.64	(-) 61.11
1976-77	4,533.7	135.00	2.98	(+) 87.24
1977-78	4,797.1	140.00	2.92	(+) 126.23
1978-79	5,023.9	145.00	2.88	(+) 36.66
1979-80	5,484.6	200.00	3.65	(-) 66.24
*1980-81	6,096.3	220.00	3.60	(-) 197.87

6.3. The amount set aside from Revenues for depreciation has depended mainly upon the financial position of the Railways. The position became further vitiated with the effort on the part of the Railways to always present 'a balanced budget.' The Committee found the evidence tendered by the Financial Commissioner, Railways, and the Chairman, Railway Board,

before the Railway Convention Committee, 1980, meaningful in this context and would like to reproduce the same from the Fifth Report of RCC, 1890.\*

"The Financial Commissioner, Railways replied :

"This (contribution to Depreciation Reserve Fund) has to come entirely out of the revenues. So we have to do a balancing trick-how much can we set apart for this depreciation reserve fund.... Perspective planning can be done in a realistic manner provided we have control on both the components resource mobilisation aspect of it and the incurring of expenditure of a certain amount....As far as resource mobilisation is concerned that is from fares and freight charges only....On these we have absolutely no control. We have to live year to year from hand to mouth. We come up with certain ideas in our proposals. These have to be passed through various obstacles.

"The Chairman, Railway Board, supplementing him added :

"This DRF contribution or lack of contribution or lesser level of contribution can result from two things (i) lack of will to raise the resources which means not taking very many unpopular decisions in keeping with the fare and freight structure commensurate with our costs with the result that if we do not want to go in for a heavy deficit budget, we just make less contribution to DRF and thereby present a more balanced budget.....There has to be a will to raise resources commensurate with our pricing or commensurate with the increase in prices of different commodities that we purchase. (ii) There has also to be an increase in productivity....to generate sufficient resources so that we are able to give to DRF and that will enable us to maintain our assets better".

6.4. Thus, we find that in an effort to put up a satisfactory financial image, the provision made for depreciation has greatly suffered in order to bolster up the surplus. This phenomenon has been manifest after the mid-Sixties.

6.5. The appropriations proposed by the Railways were sent to the RCCs to for their acceptance. We note that they have been generally accepting these proposals. The position in this regard is shown in Annexure A.1.2.

6.6. The money required for renewal and replacement of assets is withdrawn from DRF and under the prevalent rules of allocation, effective from 1 April, 1950, the full cost of replacement, inclusive of inflationary and improvement elements, is debited to DRF. The total appropriation to DRF (from Revenues, Capital and interest on the Fund balance). the withdrawal from the

\* Page 14 of the Report.

†† Capital-at-charge includes expenditure on non-wasting assets (land, formation, inventories and investment in shares), but excludes assets created out of the Development Fund (LF) and Accident Compensation, Safety and Passenger Amenities Fund (ACSPF). The latter also are replaced at the cost of DRF.

The inclusion of non-wasting assets and exclusion of assets created out of DF and ACSPF largely counterbalance each other's effect on the percentage of appropriation to the Capital-at-charge.

\*\* First year of Sixth Plan.



Fund and the closing balance from 1950-51 onwards are given in Table 1.6.

Table 1.6

DRF : Appropriations to, withdrawals from and closing balances.

(Rupees in crores)

Year	Total appropriation	Withdrawal	Closing balance
1951-52	33.79	35.87	122.02
1952-53	34.42	40.89	116.36
1953-54	33.97	38.02	112.79
1954-55	33.72	45.82	100.69
1955-56	48.67	45.89	103.47
1956-57	48.90	43.68	103.14
1957-58	49.38	63.62	88.89
1958-59	48.40	80.72	56.70
1959-60	47.96	68.36	37.30
1960-61	46.64	64.04	19.79
1961-62	67.63	58.23	29.19
1962-63	69.02	75.37	22.84
1963-64	82.57	72.40	32.97
1964-65	85.69	75.39	43.27
1965-66	88.49	78.91	52.85
1966-67	104.61	79.69	77.76
1967-68	100.33	93.82	79.74
1968-69	101.09	80.39	98.17
1969-70	102.34	73.78	126.38
1970-71	108.54	90.68	144.47
1971-72	114.36	90.87	167.61
1972-73	120.53	113.60	174.16
1973-74	126.02	125.14	175.74
1974-75	126.86	112.52	189.98
1975-76	127.98	124.57	197.93
1976-77	148.75	125.22	218.67
1977-78	155.62	117.64	256.15
1978-79	162.57	136.19	282.87
1979-80	219.61	187.45	313.07
1980-81	240.64	278.63	275.59
1981-82 (BE)†	370.75	450.00	244.68
1981-82 (RE)†	366.38	489.27	152.70
1982-83 (BE)†	512.60	523.00	142.30

6.7. We have noted with concern that from 1962-63, while the appropriations from year to year were low, the withdrawals were even lesser. While the balance in the Fund gradually declined from Rs. 122.0 crores in 1951-52 to Rs. 22.8 crores in 1962-63, the Fund balance thereafter steadily increased to Rs. 313.0 crores by 1979-80. Till 1973-74 the withdrawals from the Fund were not included in the Plan outlay, and it was fully within the competence of the Railways to withdraw as much amount as was permitted by the balance. Despite this position, the Railways unfortunately did not spend adequate amounts on renewal and replacement.

‡ Budget Estimate.

† Revised Estimate.

\* The original Plan period was from 1974-79. Later on, the

6.8. The withdrawals from DRF from 1974-75 were regulated by the Planning Commission and they formed part of the total Plan outlay for the Railways. However, during the original\* Fifth Plan period (1974-79) the actual Plan expenditure was Rs. 2,014 crores, as against the approved outlay of Rs. 2,152 crores (excluding Rs. 50 crores for MTP). The reduction in inventories accounted for Rs. 101 crores out of the total saving of Rs. 138 crores. The Committee are of the view that when sufficient balance under DRF was available, the Railways should have tried to utilise this saving on renewal and replacement instead of allowing the balance under DRF to go up from Rs. 175.7 crores (on 31st March, 1974) to Rs. 282.8 crores (on 31st March, 1979).

6.9. The Committee are happy to note that from the Sixth Plan the Railways have become increasingly aware of the need to provide adequate amounts in DRF for renewal and replacement. This Plan has been looked upon as the 'rehabilitation plan'. The appropriation to DRF\*\* has been steadily stepped up in this Plan from Rs. 220 crores in 1980-81 to Rs. 500 crores in 1982-83. However, as the Committee have already shown in Part-I of their Report and would also bring out later in this Report, even this level of contribution to DRF is inadequate. The Committee note that the Minister of Railways in his Budget speech for 1982-83, had also admitted that he would have liked to provide for a much higher amount in DRF but that the overall constraints were a limiting factor.

6.10. Poor investment on replacement and renewal has resulted in the accumulation of overaged assets in the system. An amount of about Rs. 3,000 crores (at current prices) will be needed to wipe out the arrear. Table 1.7 gives the asset-wise break-up.

Table 1.7

### Arrear of renewal and replacement

Item	Physical arrear as on 31 March 1982	Amount required to wipe out the arrear. (Rupees in crores)
1. Structural engineering works	50,000 residential quarters.	150.00
2. Track.—		
(i) Permanent way : primary renewal	10,300 kms. }	1,357.2
secondary renewal	6,544 kms. }	
(ii) Points & crossings renewal	Lumpsum	75.0
(iii) Bridges	2,700 early steel bridges and distressed bridges.	75.0
3. Rolling Stock.—		
(i) Locos	255	55.5
(ii) Coaches	2,909	201.6
(iii) Wagons (in 4-wheelers)	30,370	486.0
4. Equipment (machinery & plant etc.)		
Percentage of overaged equipment in.		
(a) Workshops	75%	600.0
(b) Production units	50%	...
Total		3,000.3†

Plan was terminated in 1977-78.

\*\* From Revenues.

† Detailed calculations are given in Annexures A-1.3 to A-1.9.



6.11. We appreciate that it would be difficult to appropriate the entire amount of Rs. 3,000 crores to DRF in one sweep. On the other hand, if the period is unduly prolonged, it would become increasingly difficult to cover the leeway. A realistic balance between these two extremes would have to be struck and the arrears phased out on priority.

6.12. In addition to the appropriation to cover the backlog, adequate amount must be regularly credited to DRF, so that no further arrear in renewal and replacement piles up. Only then the Railway assets can be expected to function at the required level of efficiency and productivity.

#### 7.0. A remedial strategy.

7.1. **Appropriation to DRF.**—It appears that the concept of depreciation has been one of the most controversial issues in the field of accounting. Various authorities have given different meanings to it and a variety of methods exist for its computation. Basically, depreciation should represent the capacity to replace the wasting asset which has expired in the process of earning the revenue of an undertaking. Provision against this loss of capital is an integral part of conducting business during the effective life of an asset, and is not dependent upon the amount of profit earned. In commercial accounting conventionally depreciation has been a process of allocation of the historical cost over a period of years. In such a system building up of adequate funds to replace the asset at the end of its full service potential is not achieved.

7.2. If an undertaking fails to provide sufficient sums for replacement of existing assets, and simply provides for a sum equal to the original cost of its existing assets when prices are rising, it is virtually liquidating its capital. Apart from weakening the real capital base-inadequate provision for depreciation leads to distortion in transport pricing on the Railways.

7.3. In the Committee's view, there should be no two opinions on the proposition that the amount of depreciation would have to take into account the full cost† of replacement on the due date; otherwise the operating capabilities of the system would get eroded and the reported earnings/losses would prove to be unreal.

7.4. We have given considerable thought as to how to work out the amount to be appropriated to DRF, we recommend that the amount to be annually credited to DRF should be made up of provisions required :—

1. To liquidate the accumulated backlog.
2. To ensure timely renewal and replacement of existing assets with residual life.
3. To ensure provision as in 2 above for new assets.

† This will include the cost of inflation and improvement. The Depreciation Reserve Fund is in fact a Renewal Reserve Fund. The Railways did take note of the implications of inflation and started charging the inflationary element in addition to the original cost from as early as 1 April 1936. From 1 April 1950 a change was introduced to charge the improvement element also to DRF. Thus, from this date, DRF bears the full cost of replacement including the inflationary and improvement elements.

4. To ensure that adjustments are made for inflation, technological advancements, and possible changes in the life-span of the assets.

7.5. These components are dealt with one by one in the succeeding paragraphs.

#### 8.0. Provision required for arrears.

8.1. We have already brought out in paragraph 6.11 that the period during which the arrear should be liquidated has to be fixed realistically. In our opinion, the phasing can be done, at the most, over a period of ten years so that, on an average, every year an amount of approximately Rs. 300 crores is set aside for DRF on this account to be suitably adjusted with the fluctuations in the level of prices.

#### 9.0. Provision required for existing assets.

9.1. The original value of the wasting assets as on 31st March, 1981, and their current cost of replacement is given in Table 1.8.

Table 1.8

Category	Original value on 31st March 1981*	Current replacement cost††
1. Structural engineering works	735.1	6,480.7
2. Track—		
(i) Permanent way	1,226.4	8,478.2
(ii) Bridges	670.2	3,500.0
3. Rolling stock —		
(i) Locomotives	953.7	4,063.7
(ii) Coaches (including EMUs)	775.2	2,897.8
(iii) Wagons	1,069.0	8,705
4. Equipment (machinery and Plant etc.) other than Rolling stock.	457.6	2,745.6
Total	5,887.2	36,871.7

9.2. The current replacement cost of assets is Rs. 36,871.7 crores. Out of this, assets valuing Rs. 3,000.3 crores are over-aged and as stated in Para 8.1 should be replaced over a period of around 10 years. On the remaining assets valued at Rs. 33,871.4 crores, annual depreciation on a straight-line method works out to Rs. 885.4 crores. Table 1.9 gives the category-wise details (Page 23).

\* The figures represent the original value of wasting assets including those created out of DF and ACSF. All these assets are replaced at the cost of DRF. These figures are inclusive of improvement element of assets replaced at the cost of DRF. The improvement element from 1st April 1950 till 31st March 1981 amounts to Rs. 492.0 crores.  
Source : Appendix VII of Explanatory Memorandum on the Railway Budget of 1982-83.

† Details are in Annexures A-1.10 to A-1.16



Table 1.9

## Depreciation on replacement-cost basis

Rupees in crores)

Particulars	Current replacement cost \$	Arrear †	Current replacement cost less arrear (2) - (3) @	Average life (in years) @	Depreciation on current replacement cost less arrear (4) % (5)
1	2	3	4	5	6
1. Structural engineering works	6,480.7	150.0	6,330.7	80	79.1
2. Track—					
(i) Permanent way	8,478.2	1,432.2	7,046.0	30	234.9
(ii) Bridges	3,500.0	75.0	3,425.0	80	42.8
3. Rolling stock—					
(i) Locos	4,063.7	55.5	4,008.2	40	100.2
(ii) Coaches (including EMUs)	2,897.8	201.6	2,696.2	25	107.8
(iii) Wagons	8,705.7	486.0	8,219.7	35	234.8
4. Equipment (machinery and plant etc.) other than rolling stock.	2,745.6	600.0	2,145.6	25	85.8
<b>Total</b>	<b>36,871.7</b>	<b>3,030.3</b>	<b>33,871.4</b>		<b>885.4</b>
Annual depreciation expressed in terms of percentage of the present day replacement cost.		$\frac{885.4 \times 100}{33,871.4} = 2.6\%$			

1. Provision of depreciation Rs. 885.4 crores†† for assets in existence as on 31st March 1981.

2. Provision of depreciation Rs. 15.2 crores†† @2.6 per cent of the assets valuing Rs. 583 crores added during 1981-82.

3. Total provision of depreciation for assets existing as on 31st March, 1982. Rs. 900.6 crores††

9.3. The provision of depreciation of Rs. 900.6 crores covers the original cost of assets as well as the inflationary and improvement elements. Its break-

up into these two components is :—

1. Original cost component Rs. 149.7 crores†
2. Improvement and inflationary components. Rs. 750.9 crores

Rs. 900.6 crores

10.0. Provision of depreciation for new assets acquired from 1982-83 onwards.—

10.1. We have gone into the question of the feasibility of maintenance of registers for each of the new assets to be introduced in the system from 1982-83 onwards and working out the requirements of depreciation depending upon the life of each asset. We find that such a system would be very cumbersome, and the results achieved would not be commensurate with the cost or effort of maintaining separate registers. We, therefore, recommend that the present system of grouping the assets in the categories listed in the Block Account (as shown in column 1 of Table 1.9) may be continued.

Source \$Table 1.8 †Table 1.7  
@ Annexure A-1.17.  
\$ Total of Column (6) of Table 1.9.

††  $583 \times 2.6 = 15.2$  crores. The figure of Rs. 583 crores is made  
100

up of (i) Rs. 544 crores on Capital works, (ii) Rs. 28 crores on DF works and (iii) Rs. 11 crores on works charged to ACSPF.

† Details in Annexure A-1.18.



10.2. There is always a time-lag in the availability of the Block Account and the preparation of the Budget. For instance, when the Budget for 1982-83 is prepared, the Block Account available is only for 1980-81. It is, therefore, clear that the category-wise up-to-date details of the assets are not available at the time the Budget is prepared. In a situation like this, it would be pragmatic to assess depreciation on a percentage basis. This percentage should be 2.6\*.

10.3. Appropriation to DRF to be made for the new assets introduced in 1982-83 would thus be :—

- |  |                  |
|--|------------------|
| 1. Cost of new assets as per the Budget for 1982-83. | Rs. 553.0 crores |
| 2. Depreciation provision @2.6 per cent**            | Rs. 14.4 crores  |

10.4. Total appropriation to DRF thus works out as :

- |  |                  |
|--|------------------|
| 1. For backlog of arrears PLUS           | Rs. 300.0 crores |
| 2. For assets upto 31 March, 1982. PLUS  | Rs. 900.6 crores |
| 3. For assets added in the year 1982-83. | Rs. 14.4 crores† |

Total Rs. 1,215.0 crores (Gross)

MINUS

- |                                    |                          |
|------------------------------------|--------------------------|
| 4. Credit due to released material | Rs. 103.7 crores‡        |
|                                    | Rs. 1,111.3 crores (Net) |

Say, Rs. 1,110 crores

10.5. The annual provision for depreciation, as worked out above, is made up of :  
(Rupees in crores)

	Gross	Net
1. Provision required to wipe out the arrear in 10 years at current prices.	300.0	260.0§
2. Current provision	915.0	850.0
Total	1,215.0	1,110.0

10.6. For subsequent years, the provision for the new assets acquired would have to be added to the figure of Rs. 1,110 crores and allowance made for fluctuations in prices.

11.0. Adjustment for inflation etc.

11.1. Inflation today is a world-wide phenomenon. Many countries have recently experienced inflation rates well in excess of 10 per cent per annum. There is a broad consensus that inflation will continue to plague the different economies of the world. It is, therefore, the duty of the management to reckon with the trend and allow for price variations in arriving at the provision of depreciation. This is particularly important for an organisation like the Railways which hold assets of long lives, during which prices can increase very substantially. The extent to which price indices have risen in the seventies are given in Table 1.10 (page 27).

11.2. The movement of the above selected economic indicators during the period 1970-71 to 1980-81 is graphically shown in a graph (page 28).

Table 1.10

Increase in price indices

Item	1970-71	1980-81	Percentage increase (compound)
1. Wholesale price index—			
(i) All commodities	100	257.3	9.9
(ii) Fuel, power, light and lubricants.	100	354.3	13.5
(iii) Basic metals and alloys	100	275.4	10.6
(iv) Iron, steel & ferro-alloys	100	272.4	10.5
(v) Manufactured products	100	257.3	9.9
(vi) Cement, Lime & plaster	100	232.6	8.8
(vii) Non-ferrous metals and alloys.	100	284.4	11.0
Consumer price index	100	216.6	8.0
(Rupees in lakhs)			
‡‡2. Cost per wagon	0.3	1.0	12.4
‡‡3. Cost per coach	2.0	7.8	14.6
‡‡4. Cost per loco (WDM-2)	26.9	61.9	8.5

\* Working shown in Table 1.9.

\*\* The figure of Rs. 553.0 crores is made up of (i) Rs. 504.0 crores on Capital works (ii) Rs. 32.0 crores on DF works and (iii) Rs. 17 crores on works charged to ACSPP.

† Strictly speaking, the assets introduced in the system in replacement of backlog of arrears of Rs. 3,000 crores should be considered as new assets for the purpose of provision for

depreciation. Since, however, it is not possible to keep separate account of these assets (charged to DRF) and as the amount involved is negligible as compared to the total contribution, this element is being ignored on practical grounds.

‡ Details are in Annexure A-1.19.

§ Details in Annexure A-1.20.

‡‡ Broad assessments.



11.3. Except for the wholesale price index of fuel, the movement in other indices is more or less parallel. Because of a large variety of assets, it is not possible to straightaway link with one or the other economic indices. Besides, one is not too sure as to what would be the rate of inflation during the coming years. In these circumstances, it is hard to prescribe a formula which could easily be applied to determine the effect of inflation. It is, therefore, recommended that the Railways should compute the effect of inflation themselves at the end of each year on the basis of the trend of actual purchase prices during the year, and adjust the depreciation provision accordingly. While doing so, adjustment for price escalation be also made for the backlog represented by balance in DRF. From the quantum of inflation so worked out, the interest credited to the Fund should be deducted.

11.4. In order to simplify matters, the Railway should select some representative and costly items used by them and make a broad assessment of the adjustment to be made for price variation. No elaborate and time-consuming exercise aimed to achieve a very high order of accuracy and precision is required. This seems to be the only practical way of tackling this complex issue.

#### 12.0. Appropriation to DRF to be independent of likely withdrawal.

12.1. The amount of depreciation, worked out on the above basis, should be appropriated to DRF every year, irrespective of the varying amounts required to be withdrawn from DRF from year to year. Why this is essential is aptly spelt out by the first Committee, 1923, on Depreciation Fund. This Committee stated :

"What is required for Railways in India which are the property of the State is not a Depreciation Fund in the sense in which the term is understood generally in the commercial world, namely, an institution which accumulates a reserve representing in value the equivalent of the expired capital outlay, but a reserve which will, with a minimum amount of accumulation, facilitate the timely execution of renewals with a view to maintaining the property up to the highest standard of efficiency and ensure that on occasions when renewals due are deliberately or unavoidably postponed the provision to meet them is debited to the Revenue Account of the period concerned by credit to the Reserve Account to be spent later-on when conditions are more favourable or circumstances permit".

12.2. The above views were also endorsed by RTEC which, inter alia, observed. "It is necessary that contributions to DRF should be worked out on a proper basis irrespective of the varying amounts required for physical replacements from year to year, or the production capacity available in the country at a particular time."

12.3. We regard these observations as based on sound reasoning and as salutary reminders of the need to provide for proper depreciation in the Railways. The Committee would recommend that there should be no arbitrariness in dealing with this important issue. The appropriation to DRF should be worked out according to the methodology suggested above. This should not depend upon the likely withdrawal from the Fund nor should it be reduced, based on the desire to balance the budget or to project a better financial picture of the Railways.

#### 13.0. Periodical review.—

13.1. The Committee recommend that after every five years, current replacement cost of assets should be computed afresh and the level of appropriation to DRF determined on the methodology suggested by us. At the time of such a review, the uncovered inflation, if any, the technological advancements and changes in the life of assets due to their extent of utilisation etc. should adequately taken care of.

#### 14.0. Appropriation (withdrawal) from DRF.

14.1. The withdrawal from DRF should depend upon requirements of physical replacement, the production capacity available in the country and the extent to which import is considered necessary and found practicable.

#### 14.2. The withdrawal from DRF should cover :

1. Amount necessary to liquidate arrears in renewal and replacement in a phased manner\* As far as possible, the following time schedule should be observed to wipe out the accumulated backlog :

<u>Category</u>	<u>Period to wipe out arrear (in years)</u>
(i) Replacement of overaged wagons.	2
(ii) Replacement of overaged coaches.	4
(iii) Primary and secondary renewal of track	10
(iv) Distressed bridges	3
(v) Other assets	10

2. Current arisings of replacement and renewal, duly keeping in view the phasing out of steam locomotives recommended in Part II of our Report.

14.3. The Committee would like to emphasise that appropriation of adequate amounts to DRF regularly and their use towards renewal and replacements, would help to give a shot in arm to the industries and encourage them to enhance their capacity and quality of production. Depending upon the long-term investment plan on the Railways, action should be taken to encourage a higher production capacity in the country based on long-term orders.

#### 15.0. Outlay vis-a-vis Plan-ceiling.

15.1. Until 1973-74, the investments on renewal and replacement were kept outside the allotments made by the Planning Commission. There has, however, been a shift in the position from the beginning of the Fifth Five Year Plan in 1974-75. At this time the concept of net capital formation got substituted by gross capital formation, so as to fully cover the depreciation as part of the Plan. It is necessary to appreciate the significance of this change. With this change, the cost of assets brought into being as replacements were included in the formation of capital and thereby the outlay on DRF became a part of the Plan-ceiling.

The Committee are aware that with the phasing of the arrear suggested, the amount needed for wiping out the same may in the initial years be more than the average of Rs. 300 crores per

annum. Should it be found necessary, balance already available in the Fund could be utilised.



15.2. This has given rise to a tricky situation. There are competing priorities for development planning on the Railways, and in respect of some of them like new lines, terminals, conversion projects etc., there is also a lot of emphasis from concerned Ministries and other groups. When DRF became subservient to the total Plan-ceiling, as mentioned earlier, this had very often to give precedence to other projects. The maintenance and upkeep of the system as a result has suffered. It is our opinion that the system which has made withdrawal, from DRF subservient to the overall Plan-ceiling has not in practice worked well or for the good of the systems and needs to be changed.

15.3. In the Sixth Five Year Plan, the Railways asked for an outlay of Rs. 11,817 crores, against which an allocation of Rs. 5,100 crores was found possible. As a sequel to this reduction in the aggregate Plan-ceiling, the outlay under DRF also got slashed.

15.4. Earlier also, for the Fifth Five Year Plan, the Planning Commission has allotted Rs. 2,202 crores to the Railways as against their need-based requirement of Rs. 2,980 crores. While reviewing the working and financial results of the Railways during the Fifth Plan period, RCC, 1980, commented\* on the role of the Planning Commission as under :

"The distressing feature of the Fifth Plan investments for Railways has been the inequitable approach of the Planning Commission to the investment proposals of the Ministry of Railways..... The Committee are, however, unable to appreciate the progressive reduction in the Plan outlay without regard its possible adverse impact on the performance of the Railways. The Committee have elsewhere in the Report already commented upon the dismal performance of the Railways during the Fifth Plan Period. At this stage, they would only like to put a word of caution that any dent in the Railways Plan resources is bound to cause widespread repercussions in almost all fields of the country's economic activities. They hope that Planning Commission would, while assessing, reassessing and finalising the Plan investment for the Railways constantly keep in view the nodal position of the Railways in the country's economic milieu..... The Committee regret that neither the Ministry of Railways nor the Planning Commission could perceive in right time the need for adequate provisions for Depreciation Reserve Fund. Timely appreciation in this regard would have saved the Railway operations from the dire predicament that it faces today on account of massive rehabilitation backlog."

15.5. We, therefore, recommend :

1. The outgo from DRF should be controlled by the Railways as it is required for essential renewal and replacement to keep the capital assets intact. Such expenditure should not be regulated by any agency other than the Railways. This also follows from the concept of separating Railway Finances from the General Finances.
2. The planning Commission should be concerned with the allotment of the amount required on capital account as a budgetary support to the resources generated by the Railways themselves. This budgetary support should have direct

relationship with the amount needed by the Railways, to complete, within a reasonable period of time, the ongoing works and the new works needed for lifting additional anticipated traffic.

15.6. We recognise that this will require some care in the estimation of gross capital formation for national income accounting. The problem can be taken care of by first assessing the budgetary support to be allotted to the Railways for movement of additional traffic, and then adding to this the figure of withdrawal from DRF as intimated by the Railways. There should be no difficulty for this system to be brought into use in the Planning Commission.

#### 16.0. Implications.

16.1. A summary of the financial results anticipated for 1982-83 is indicated in Table 1.11.

Table 1.11

#### Financial results

#### Budget Estimate 1982-83

(Rupees in crores)

1. Gross traffic receipts	4,171.79
2. Total expenditure excluding appropriation to DRF	3,160.88
3. Appropriation to DRF	500.00
4. Total expenditure (.2) + (.3)	3,660.88
5. Net Railways revenue (.1) — (.4)	510.91
6. Dividend payment to General Revenues.	405.12
7. Gross surplus (.5) — (.6)	105.79
8. Appropriation to DF and payment of deferred dividend liability.	105.79

16.2. In part I of the Report, the Committee has brought out that over and above the budgeted figure of withdrawal of Rs. 523 crores, an additional amount of Rs. 309 crore will have to be withdrawn from DRF and to enable the Railways to do that, the level of appropriation should be raised from Rs. 500 crores to Rs. 809 crores. This estimation was done as a short-term measure for accelerating the renewal and replacement of track, coaches and wagons, provision for depreciation for other assets, as provided by the Railway Board, remaining the same. We have since then taken into account all the assets on the Railways and worked out broadly what should be the annual level of appropriation to DRF from Revenues. This figure works out to Rs. 1,110† crores.

16.3. It is appreciated that it may not be immediately possible for the Railway Board to enhance the appropriation to DRF from Rs. 500 crores to Rs. 1,110 crores. As already recommended by us in Part I of our Report, submitted in May 1982, appropriation to DRF may be stepped up from Rs. 500 crores to Rs. 909 crores in 1982-83. For this, the Railway Board would have

\* Pages 21-23 of the Report.

† To be adjusted for new year assets added from year to year and for fluctuations in prices.



by now already approached RCC. From 1983-84 onwards, the appropriation to DRF should be made at the level of Rs. 1,110 crores plus depreciation provision for new assets added from year to year with suitable adjustments for price variations.

16.4. If the appropriation to DRF is stepped up from Rs. 500 crores to Rs. 809 crores in 1982-83, the net railway revenues will fall from Rs. 510.9 crores to Rs. 201.5 crores, as a result of which the Railways will not be able to discharge their dividend liability in full. The position may be worse in 1983-84 and onwards, when the level of appropriation to DRF is raised as recommended. The net railway revenue may then even turn into a deficit in some years, resulting in the Railways neither being able to discharge their liability of payment to dividend nor their building up DF.

16.5. A situation like this calls for an immediate review of the cost and price structure of the services provided by the Railways. We appreciate that the contribution to DRF taken at the level of Rs. 1,110 crores, will necessitate a steep rise in fares and freight. We recommend that out of Rs. 1,110 crores only Rs. 850† crores representing depreciation in respect of assets other than arrears be considered for rationalisation of fares and freight. The balance amount of Rs. 260 crores required to tide over the backlog should not be taken into account for revision of fares and freight. Instead, the General Exchequer should provide a subsidy of Rs. 260 crores\* every year till the backlog is cleared. This justified on the ground that it is because of the inadequate appropriation to DRF in the past that such a situation has arisen, and it will be unfair to penalise the current users of rail transport for the past neglect by including the arrear in the pricing structure.

16.6. The Committee recognise that even if the element of Rs. 850 crores is taken as a part of the cost, the increase in fares and freight may be distressing. The necessity for phasing out the increase in fares and freight in steps, though the appropriation to DRF should in any case remain at the level of Rs. 1,110 crores per annum.

16.7. Apart from rationalisation of fares and freight the Railways will have also to seriously consider other measures for augmenting their earnings by minimising the incidence of ticketless travel and leakage of freight. They will further have to adopt a well conceived all-out marketing strategy to capture more and more and specially the high-rates, traffic. The uneconomic services will have to be identified and steps taken either to make viable or reduce or discontinue them where alternate cheaper modes of transport exist. The Government will also have to reduce the incidence of thefts of fittings in the rolling stock, minimise the incidence of compensation claims and modernise technology and operational practices to improve utilisation of rolling stock. A host of other measures will be necessary to bring down the working expenses. These aspects have been briefly mentioned here, as some of them have since been separately dealt with in Part-II of our Report on Transportation, with some other will be dealt with in subsequent parts.

16.8. Should, however, a situation arise that even after taking all possible steps, the Railways are not able to fully discharge their liability to pay dividend to the General Exchequer, attempt should not be made to do so at the cost of appropriation to DRF, because consequence of such a measure is very adverse to the whole system. Under such circumstances, there

should be a waiver in the liability of the Railways to pay such dividend, until the system picks up and the Railways are again in a position to pay the normal dividend. For that period, the Union Government should perhaps cover the gap in dividend liability from the General Exchequer.

16.9. We however appreciate that such waiver cannot be suggested in perpetuity, and, therefore, recommend the same only for the next five years during which the Railways should optimise their performance.

16.10. Such a strategy would not be unjustified when it is considered that the Railways form an integral part of the national economy, as a limb of the Union Government, and are engaged, with the rest, in the development of the national economy. In case, the requisite contribution to DRF is not made, the system would suffer a more serious setback and such a situation must be avoided.

#### 17.0. Conclusions.

17.1. The appropriation to DRF should no longer be made on an arbitrary basis, but in accordance with the methodology suggested by us. It will be necessary upto date every year the contribution to DRF, keeping in view the new assets added to the system and the fluctuations in prices. It will not be prudent to scale down the contribution to DRF in order to artificially bolster up the surplus.

17.2. The annual appropriation to be made to DRF will now be of the order of Rs. 1,110 crores or more. This is considerably higher than the present level of contribution, principally because of past defaults. This would call for rationalisation of fares and freight. A massive drive to improve the viability and productivity of the system will also have to be simultaneously launched.

17.3. For rationalisation of fares and freight, the appropriation to DRF required for wiping out the arrear, viz. Rs. 260 crores per annum, (out of Rs. 1,110 crores), should not be considered, as it would be unfair to penalise the current users of rail transport for the past neglect. This amount, on the other hand, should be provided as a subsidy by the General Finance till the arrear is liquidated.

17.4. Even if the remaining amount of Rs. 850 crores is taken as an element of cost, an one-time increase in fares and freight may be distressing. The Railways may, therefore, consider doing this in stages. The appropriation to DRF, nevertheless, should not be reduced to arrange payment of dividend, and must invariably be not less than Rs. 1,110 crores annually, with additionality to reckon with new assets and element of inflation. To the extent found necessary, the liability to pay dividend should be waived and the gap covered by the General Finance. Such waiver should, however, not be in perpetuity, but for a maximum period of five years, and by that time the Railways should be able to optimise their performance.

17.5. The amount to be appropriated to DRF every year should not depend on the varying amounts required to be withdrawn from DRF. Every five years a review should be carried out and revised depreciation worked out.

17.6. The withdrawal from DRF should depend upon the requirement of physical replacement availability of material.

† This figures will get modified from year to year due to price variations and addition of new assets in the system.

\* To be adjusted for price variations from year to year.



17.7. The withdrawal from DRF should hereafter be controlled by the Railways and not any other Agency.

17.8. If these recommendations are not accepted, the operational efficiency of the Railways would be increasingly impaired, their pricing policy will remain distorted and their capital will continue to be eroded.

*Annexure A.1.1.  
(CF para 2.1)*

**Important observations made by some Committees for the creation of Depreciation Reserve Fund.**

#### I. The Acworth Committee (1921).

The Acworth Committee strongly criticised the failure of the Government to establish during the War a reserve which could have been drawn upon later for clearing the backlog of arrears when the materials for carrying out such renewals were available. The Committee observed :

"The principle is clear that by the time useful life of an asset or a building has expired, its full original cost should have been written off out of Revenue. This has not been the case on the Indian Railways. There are scores of bridges with girders unfit to carry train loads upto modern requirements; there are many miles of rails, hundreds of engines, and thousands of wagons, whose rightful date for renewal is long overpast. Their cost has not been written off. They stand in the books at the original figure. The Government has formed no replacement reserve. It is not now physically possible within a short period of one or two years to replace all the Plant of which the economic life is exhausted. If it were possible, it would be a burden upon current revenue too heavy to be borne without upsetting the normal railway finance. The position due to the unwise methods of the past must be redressed gradually. It will never be redressed under the present system of programmes and annual grants and lapses, but only when commercial accounting methods are introduced in the management of a commercial undertaking. In our judgement, a financial system which produces these results stands self-condemned. . . . Obviously the expenditure (on replacement and renewals) was only postponed, and had to be faced later on. An ordinary commercial concern would, as a matter of course, have carried the money so underspent to a reserve for renewals, to be spent when the material were again available. The independent railway companies did this. Not so the State.

#### II. The Railway Finance Committee (1921).

The Railway Finance Committee, reporting in the year 1921, expressed the following views :

"We consider that the present method of providing for depreciation not by a proper depreciation fund but by allotting each year a grant from revenue for expenditure on renewals and replacements is open to many objections. We, therefore, recommend that early steps should be taken to calculate the rates of depreciation which should be allowed for the various classes of railway plant and material in order that the occurrence of the deterioration which has taken place in recent years may be avoided and depreciation for repairs and renewals provided automatically."

#### III The Inchcape Committee (1923).

The Inchcape committee, in their report beginning 1923, recommended that each Railway should make adequate provision every year for the maintenance and renewal of its permanent way and rolling stock and the funds so earmarked should be debited to the working expenses and carried to suspense account, which should be drawn upon as necessary to meet current requirements, the balance being carried forward from year to year.

#### IV. First Committee on Depreciation Fund (1923-24).

The Committee observed that "It seems to us at the very outset, that having regard to the permanent character of our Railways and of the fact that apart from their dividend earning capacity they are organisations that confer unlimited indirect benefits on the country and are unable consequently to common/unlimited credit, that what is required for Railways in India which are the property of the States is not a Depreciation Fund in the sense in which the term is understood generally in the commercial world, namely, an institution which accumulates a reserve representing in value the equivalent of the expired capital outlay, but a reserve which will, with a minimum amount of accumulation facilitate the timely execution of renewals with a view to maintaining the property upto the highest standard of efficiency and ensure that on occasions when renewals due are deliberately or unavoidably postponed the provision to meet them is debited to the Revenue Account of the period concerned by credit to the Reserve Account to be spent later on when conditions are more favourable or circumstances permitted."

All the Committees had emphasised constitution of a proper Depreciation Reserve Fund to facilitate timely execution of renewals. These Committees stressed the need to credit the Fund with adequate amounts.

*Annexure A. 1.2  
(Cf. para 6.5)*

#### **Railway Convention Committee on DRF**

Appropriations asked for by Railways and those accepted by the RCCs are tabulated below :

*(Rupees in crores)*

Year	As asked for by the Rlys.	As accepted by the RCC	As actually appropriated	Remarks
1966-67		On an average annual contribution was to be Rs. 130 crores rising from Rs. 100 crores in the first year (1966-67) to Rs. 160 crores in the year 1970-71 or as close thereto as possible taking account of the financial position.	100	This recommendation was made by RCC, 1965. The actual appropriations to DRF were lower than those recommended by the RCC mainly on account of Railways' difficult revenue position. (The lower appropriation was made in light of the permissive provision made in the recommendation).
1967-68			95	
1968-69			95	



Year	As asked for by the Rlys.		As accepted by the RCC	As actually appropriated	Remarks
1969-70	95	95	or as close thereto as possible taking account of the financial position.	95	These recommendations were made by RCC, 1971.
1970-71	100	100		100	
1971-72	105	105		105	
1972-73	110	110		110	
1973-74	115	115		115	
1974-75	120	115		115	This level of appropriation was agreed to by the RCC, 1973 pending report of the Working Group appointed by the Govt. on Depreciation.
1975-76	130	115		115	
1976-77	140	135		135	
1977-78	130	140		140	These recommendations were made by RCC, 1977.
1978-79	130	145		145	
1979-80	200	200		200	
1980-81	220	220		220	These recommendations were made by CC, 1980.
1981-82	350	350		350	
1982-83	500	500		500	

**Annexure A. 1.3**  
(Cf. Table 1.7)

**Annexure A. 1.5**  
(Cf. Table 1.7)

**Arrears in structural works**

There are 5,69,000† quarters on the Indian Railways. About 50,000\* of these quarters built prior to 1947 do not basic amenities like individual bath room, kitchen, toilet, proper ventilation etc. The replacement cost of these quarters has been assessed at Rs. 150 crores, at current prices.

**Arrears in renewal/replacement of bridges**

Out of 1.12†† lakh bridges on the Indian Railways, about 2,700††† bridges having early steel girders were erected prior to 1905. Because of substantially high content of sulphur and phosphorous in the early steel, these girders are prone to sudden failures due to brittle fractures.

**Annexure A.1.4.**  
(Cf. Table 1.7)

**Arrears in track renewal as on 31 March, 1982**

	(In kms.)	
	Primary	Secondary
1. Arrears on 31 March, 1980	7,780	5,260
2. Arising during the period 1 April, 1980 to 31 March 1982.	4,600	1,800
3. Track renewals carried out during 1 April, 1980 to 31 March, 1982.	2,080	516
4. Arrears as on 31 March 1982, (.1) × (.2) - (.3).	10,300	6,544
5. Fund required	Rs. 1,030 crores†	Rs. 327.2 crores†§
6. Total for primary and secondary renewals.	Rs. 1,357.2 crores	
Add lumpsum of renewals of Points and crossings.	Rs. 75.2 crores	
	Rs. 1432.2 crores	

2. Though no mishap has occurred so far on account of failure of these girders, there have been a few isolated cases of brittle fracture, bringing an element of uncertainty about the residual life of these girders. The cost of replacement of these early girders and distressed bridges has been estimated as Rs. 75 crores.\*\*

**Annexure A.1.6**  
(Cf. Table 7.7)

**Arrears in replacement of locos as on 31 March, 1982**

Category	Number***			Amount (Rupees in crores)
	Broad gauge	Metre gauge	Narrow gauge	
(i) Steam	..	..	217	33.2§§
(ii) Diesel	12	..	..	4.4@
(iii) Electric	26	..	..	17.9††
Total	38	..	217	55.5

Source : † Para 6.3, page 95 of Indian Railways Year Book (1980-81)

\* assessment made by RRC Secretariat after discussion with the Civil Engineering Directorate of Railway Board.

† @ Rs. 10 lakhs per km.

§ @ Rs. 5 lakhs per km.

Source : † Position paper' supplied by the Civil Engineering Directorate of Railway Board to RRC.

Source : †† Para 7.1, page 24 of Indian Railways Year Book (1980-81).

††† Position paper' supplied to RRC by Civil Engineering Directorate of Railway Board.

\*\* Assessment made by RRC Secretariat.

§§ 217 NG Steam Locomotives will be replaced by approximately 82 ZDMs, each costing Rs. 39 lakhs.

@ One Diesel BG shunter costs Rs. 37 lakhs.

†† On Electric BG loco costs Rs. 69 lakhs.

\*\*\* Obtained from Traction Wing of Mechanical Engineering Directorate of Railway Board).



*Annexure A. 1.7*  
(Cf. Table 1.7)

**Arrears in coaches as on 31 March, 1982.**

Gauge	Number†	Amount (Rupees in crores)
Broad	1,416	188.8*
Metre	1,004	
Narrow	489	
Total	2,909	201.6

*Annexure A. 1.8*  
(Cf. Table 1.7)

**Arrears in replacement of wagons as on 31 March, 1982**

1. Number of overaged wagons (broad gauge and metre gauge), as on 1 April, 1981, (in terms of four wheelers). 37,814
2. Number of wagons which became overaged during 1981-82. 10,356
3. Number of wagons replaced during 1981-82. 17,800§
4. Overaged stock as on 31 March 1982 (.1) + (.2) - (.3) 30,370
5. Funds required — Rs. 1.6 lakh per wagon. Rs. 485.9 crores. say Rs. 486.00 crores.

*Annexure A.1.9.*  
(Cf. Table 1.7)

**Arrears in equipments**

On the basis of machinery-wise census, 77% of the Machinery and Plant in mechanical workshops, 53%

in Production Units and 46% in loco sheds and sick-lines had become due replacement by the end of the year 1978-79. With ageing and obsolescence, the condition of Machinery and Plant and deteriorated and a large proportion of these have become unfit to perform function for which these were designed and built.

A Sixth Plan projection of Rs. 740 crores was made for the replacement of Machinery and Plant. It has been assessed by Central Organisation for Modernisation Of Workshops (COFMOW) that the cost of replacement may well be in excess of Rs. 1,000 crores\*\* by the time of full implementation. As against these figures arrears have, however, been taken as Rs. 600 crores to be on the conservative side.

Arrears in other equipments like signalling etc. are not readily available.

*Annexure A.1.10*  
(Cf. Table 1.8)

**Current replacement cost of structural works**

	Plinth area in unit of 10 sq. metres.
Service buildings ...	16,94,280 (a)
Staff quarters and welfare buildings.	26,26,195 (b)
Total	43,20,475

Average current cost of construction for every 10 sq. m. Rs. 15,000 approximately††

Total cost of constructions (43,20,475 × 15,000) Rs. 6,480.7 crores

*Annexure A. 1.11*  
(Cf. Table 1.8)

**Current cost of replacement of the permanent way**

Gauge	Classification††	Running track Km.	Average life (years)	Approximate break-up of the total running track into:		Annual arisings of renewal (in kms.)	
				Primary renewal	Secondary renewal	Primary	Secondary
1	2	3	4	5		6 (5-4)	
Broad	Group A	12,080	20	12,080	...	604	...
	Group B	11,945	25	11,945	...	480	...
	Group C	1,256	20	1,256	...	63	...
	Group D	5,006	30	5,006	...	170	...
	Group E	14,660	30	9,000	5,660	300	190
Metre	Trunk route	3,590	30	3,590	...	120	...
	Main line	11,022	35	11,022	...	315	...
	Branch line	11,314	40	7,200	4,114	180	100
Narrow	Main line	901	40	901	...	25	...
	Branch line	3,391	40	2,400	991	60	25
	Siding & yards	30,000§§	50	...	30,000	...	600§§
		1,05,165		64,400	40,765	2307	915

\*@ Rs. 7.8 lakhs per Coach (average based on certain composition of coaches).

†@ Rs. 2.6 lakhs per coach (item No. 300, page 196 of Rolling Stock Programme for 1982-83).

‡ (Obtained from Mechanical Directorate of the Railway Board).

Source : Evidence of Ministry of Railways before PAC para 85 of 103rd Report (1981-82), Seventh Lok Sabha, on wagon availability on the Railways.

§ Estimated condemnation was 18,000. Actual replacement figure obtained from the Railway Board.

\*\*Discussion of Chief Administration Officer, COFMOW with the Chairman, RRC on 5 April, 1982.

Source : (a) Page 170 of Demands for Grants Part II (1982-83). (There is a misprint for S.E. Railways; the correct figure is 1,96,230 and not 16,92,302).

(b) Page 486 of Demands for Grants, Part II (1982-83).

††Assessment made by the RRC Secretariat



1. At current prices, the average cost of one Km. of primary renewal is Rs. 10 lakhs and secondary Rs. 5 lakhs. At these rates the present day cost of renewal would be :

Primary renewals Rs. 64,400 – 10 lakhs	.. Rs. 6 440.2 crores
Secondary renewals Rs. 40,765—5 lakhs	.. Rs. 2,038.2 crores
	<u>Rs. 8,478.2 crores</u>

2. Provision required for annual arising of 2,307 km. of primary renewal & 915 km. of secondary renewal =  $230.7 + 45.7 =$  Rs. 276.4 crores.
3. Average life of the track for the purpose of working out depreciation ...  $\frac{8478.2}{276.4} = 30.5$  years say 30 years.

††Group A — route earmarked for a maximum speed of 160 kmph.

Group B — route earmarked for a maximum speed of 130 kmph.

Group C — Suburban routes

Group D — routes earmarked for a maximum speed of 100 kmph.

Group E — Branch lines where speed is less than 100 kmph.

§§There are 30,000 km. of transportation sidings, yard lines, etc. which have to be renewed once in 50 years on secondary renewal basis and this would give about 600 km. of secondary renewal.

(Assessment made by the RRC Secretariat)

Annexure A. 1.12  
(Cf. Table 1.8)

Annexure A.1.13  
(Cf. Table 1.8)

#### Current cost of replacement of bridges :

There are more than 1.12 lakhs bridges on the Indian Railways. Out of these, more than 9,300 bridges are major bridges.

The aggregate water-way of all the 1.12 lakhs bridges is about 1,060 kms. Depending upon the span of the bridge, the replacement cost varies from Rs. 1,000 to Rs. 10,000 per metre of water way. Taking an average cost of Rs. 3,300 per metre of water way, the present day replacement cost of all these bridges has been assessed at Rs. 3,500 crores.

(Assessment made by the RRC Secretariat)

Current cost of replacement of locomotives				
Type	Gauge	Number*	Unit cost** (Rupees in lakhs)	Total cost (Rupees in crores)
1	2	3	4	5
Steam	Broad	4,361*** (or 410 WDS4 shunters and 1640 electric locos/ WDS6 shunters).	37.00 (for WDS4 shunters) 67.00@ (for electric locos/ WDS6 shunters).	1,250.5
Diesel	Broad	1,527	70.00	1,068.9
Diesel shunters.	Broad	339	37.0	125.4
Electric	Broad	1,016	69.0	701.0
Steam	Metre	2,763† (or 640 main line diesels and 520 diesel shunters)	57.0 (for main line locos and 37.0 for shunters).	557.2
Diesel	Metre	470	57.0	267.9
Electric	Metre	20	60.0††	12.0
Steam	Narrow	345 (or 140 diesels).	39.0	54.6
Diesel	Narrow	67	39.0	26.2
		10,908		4,063.7

\* As per the Year Book of Indian Railways for 1980-81 and Statement No. 10—Page 36 of Annual Statistical Statement (1980-81).

\*\* Item 12 Page 339, Item 5, page 338, Item 11, page 339, Item 91, Page 345, Item 110, Page 347 of Rolling Stock Programme for the year 1982-83.

@ The cost of a Broad Gauge electric loco is Rs. 69 lakhs and that of a WDS6 is Rs. 65 lakhs. For the purpose of these calculations, the figure of Rs. 67.0 lakhs has been adopted.

\*\*\* 4361 Steam locomotives have been considered as equivalent to 2050 Electric/Diesel locomotives. This estimate is based on service-wise deployment of steam locos and adopting the following norms :

(i) For Goods services:—NTKMs per loco day in use by diesels in 1980-81 vis-a-vis the best ever achieved by steam.

(ii) For Passenger services:— Engine kilometres per loco day

in use for coaching services by diesels in 1980-81 vis-a-vis by steam locos in 1980-81.

(iii) Shunting services.— A ratio of 1 : 1.5 has been adopted.

(iv) Departmental.— A ratio of 1 : 2 has been adopted.

In each case adjustment has been made for ineffectives and provision over bare requirements.

An assessment based on present deployment and traffic trends has indicated that requirements will be both for lower Horse Power Diesel shunters and heavy duty diesel shunters/electric train line. The figures of 410 (of WDS4 or equivalent type) and 1640 (electric locos/ WDS6) are based on this study).

† 2763 Metre Gauge steam engines have been considered as equivalent to 640 main line diesels and 520 diesel shunters. The basis adopted for conversion from steam to diesel is the same as for Broad Gauge.

†† Approximate.



**Annexure A.1.14**  
(Cf. Table 1.8)

**Current cost of replacement of passenger coaches**

Gauge	Class	Number	Unit cost (Rupees in lakhs)	Total cost (Rupees in crores)
1	2	3	4	5
Broad	AC	154	14.21	21.9
	AC 2-Tier Sleeper	114	17.26	13.7
	AC Chair Car	64	14.21+	9.1
	First	1,357	5.03	67.8
	Second Sleeper	3,701	6.20	229.4
	Others	6,596	6.00	395.7
	AC composites	3,971	14.21	564.3
		15,957		1,301.9-(1)
Metre	First	639	6.00	38.3
	Second Sleeper	1,226	5.60	68.6
	Others	5,467	5.00	273.3
	AC composites	2,804	10.86	304.5
		10,136		684.7-(2)
Narrow	Conventional	1,330	2.60	34.5-(3)
	Grand total (1)+(2)+(3).			2,021.1-(4)

Source : 1. For Col. 3— Statement No. 10, Annual Statement (1980-81), pages 40-45.

2. For Col. 4— Broad gauge, item 362, page 380, item 140, page 351, Assumed as same for AC class, item 129, page 349, item 363, page 380, item 364, page 380, item 123, page 348.

Metre gauge item 196, page 356, item 222, page 359, item 198, page 356, item 204, page 357.

Narrow gauge item 397, page 196 of Rolling Stock Programme, 1982-83.

**Current cost of replacement of EMU coaches**

Gauge		Number	Unit cost (Rupees in lakhs)	Total (Rupees in crores)
1		2	3	4
Broad	1. Motor coach	753	25.9	195.4
	2. Trailor coach	1,680	6.98	117.2
Metre	1. Motor coach	45	23.72	10.7
	2. Trailor coach	147	15.60	22.9
	Total	2,625		346.2

Source : 1. For Col. 2— Statement No. 10 of Annual Statistical Statements (1980-81), pages 37, 39 and 42.

2. For Col. 3— Item 160, page 353, item 161, page 353, item 201, page 357, item 202, page 357 of Rolling Stock Programme of Railway for 1982-83.

**Current cost of replacement of dining cars, tourist cars, luggage-cumbrake vans etc.**

Gauge	Number	Unit cost (Rupees in lakhs)	Total cost (Rupees in crores)
1	2	3	4
Broad	4,892	7.0	342.4
Metre	3,136	6.0	188.1
Total	8,028		530.5

Source : 1. For Col. 1— Sum. of Cols. 36, 37, 40, 44, 45, 46, 47, 49, 50, 52 and 54 of Statement No. 10 of Annual Statistical Statement (1980-81) (pages 44, 45).

2. For Col. 2— These are approximate costs.

**Summary showing current cost of coaching stock**

	Cost (Rupees in crores)
1. Coaches ...	2,021.1
2. EMU Stock ...	346.2
3. Luggage vans, dining cars etc. ...	530.5
Total ...	2,897.8

**Annexure-A.1.15**  
(Cf. Table 1.8)

**Number of wagons on line in terms of vehicle units and 4-wheelers for 1980-81 and their current cost of replacement**

	Vehicle units	4-wheelers
BG	3,09,194	4,24,017
MG	86,839	1,15,177
NG	4,913	4,913
Total wagons (4-wheelers)		5,44,107

Average cost per wagon (in 4-wheelers) Rs. 1.60 lakhs

Total cost—Rs. 5,44,107 × 1.60 lakhs  
Rs. 8,705.7 crores

Source : Annual Statistical Statement 1980-81 (Statement No. 10)

**Annexure-A.1.16**  
(Cf. Table 1.8)

**Current cost of replacement of equipment.**

The original value of equipment as on 31 March, 1981 is Rs. 457.6 crores. Under this category not only machinery and plant in production units and workshops is included but items such as signalling machinery used in stations etc., are also included. Since details of these items are not available, the original value of Rs. 457.6 crores has been enhanced in the same ratio as arrived at for permanent way and rolling stock taken together.



Only permanent way and rolling stock have been taken, as their life span is not much different from that of equipment.

1. Original value of permanent way and rolling stock. Rs. 4,024.3 crores†
2. Present day replacement cost of permanent way and rolling stock. Rs. 24,145.4 crores\*
3. Present day value of equipments.  $\frac{457.6 \times 24,145.4}{4,024.3}$   
Rs. 2,745.6 crores

Annexure-A.1.17  
(Cf. Table 1.9)

#### Normal life of assets Class

	Average life (in years)
1. Structural engineering works	80
2. Track	
(i) Permanent way	30
(ii) Bridges	80
3. Rolling Stock	
(i) Locos	40
(ii) Coaches (including EMUs)	25
(iii) Wagons	35
4. Equipment (Machinery and Plant etc.)	25

Source : Railway Board's letter No. F(X)II-75/DRF/1, dated 29-8-1977.

1. **Structural Engg. Works** : In terms of Railway Board's above quoted letter, the life of masonry and cement concrete structure is 65 years and steel structures 60 years. These lives are considered

to be on the low side and it would be realistic to take the average life as 80 years.

2. (i) **Permanent way** : Life of 30 years has been taken as per workings shown in Annexure A.1.11.

- (ii) **Bridges** : The average lives of bridge works, as given in Board's above quoted letter are as under :

1. Bridge Work-steel work	60 years
2. Bridge work-Masonry	100 years
3. R.C.C. Bridge Works	60 years
4. Pre-stressed Concrete Bridge work	40 years

On an average, the life of bridges has been taken as 80 years. Even if it is taken as 100 years on the consideration that most of the bridge work is in masonry, the change involved will be insignificant.

3. (i) **Locos** : In terms of Railway Board's above quoted letter, average life of a steam loco is 40 years. Diesel electric/hydraulic loco 36 years, shunting loco 36 years and an electric loco 35 years. Since in the near future only steam locos will get replaced, average life taken is 40 years.

- (ii) **Coaches** : Most of the coaches are steel bodied coaches. Average life of 25 years prescribed for them in Board's letter quoted above has been taken.

- (iii) **Wagons** : As per above Railway Board's letter, average life for a wagon has been taken as 30 years.

4. **Equipment** : Lives of equipments vary from asset to asset. In the absence of details available, average life of 25 years as adopted by the Expert Group on Depreciation, 1975 has been taken.

Annexure A.1.18  
(Cf. para 9.3)

#### Original cost component of depreciation

Particulars	Current replacement cost	Original cost	(Rupees in crores)		Original value of assets less original cost of arrear	Average life (in years)	Depreciation on original cost less arrears
			Current cost of arrear	Original cost of arrear			
			(3) × (4)			(6) - (7)	
			2		(3) - (5)		
1	2	3	4	5	6	7	8
1. Structural Engineering works	6,480.7	735.1	150.0	17.0	718.1	80	9.0
2. Track—							
(i) Permanent way	8,478.2	1,226.4	1,432.2	207.2	1,019.2	30	34.0
(ii) Bridges	3,500.0	670.2	75.0	14.4	655.8	80	8.2
3. Rolling stock—							
(i) Locos	4,063.7	953.7	55.5	13.0	940.7	40	23.5
(ii) Coaches (including EMUs)	2,896.8	775.2	201.6	53.9	721.3	25	28.9
(iii) Wagons	8,705.7	1,069.0	486.0	59.7	1,009.3	35	28.8
4. Equipment (Machinery and Plant etc. other than Rolling Stock)	2,745.6	457.6	600.0	100.0	357.6	25	14.3
Total	36,871.7	5,887.2	3000.3	465.2	5,422.0		146.7

† Sum of items (2)(i) and 3 of Col. 2 of Table 1.8.

\* Sum of items (2)(i) and (3) of Col. 3 of Table 1.8.



1. The original cost of assets of Rs. 5,887.2 crores include the element of improvement of Rs. 492 crores. This element will have to be deducted to work out the depreciation provision of historical cost basis. The approximate deduction on this account would be

$$\frac{146.7 \times 492}{5887} = \text{Rs. 12.2 crores.}$$

Therefore, depreciation provision on historical cost basis for assets in existence as on 31 March, 1981 would be (146.7—12.2) Rs. 134.5 crores.

2. Depreciation provision @ 2.6 of assets valuing Rs. 583.00 crores added during 1981-82  
Rs. 15.2 crores.

Total depreciation on historical cost basis for assets existing as on 31 March, 1982.

Rs. 149.7 crores.

Annexure A. 1.19  
(Cf. para 10.4)

#### Value of released material credited to DRF

Plan head	Amount provided in the budget for 1982-83 for DRF	Credit on account of released material provided for 1982-83†	Percentage (3) — × 100 (2)
1	2	3	4
(Rupees in crores)			
1. Track renewal	160.5	40.5	25.0
2. Other than track renewal	407.8	4.8	1.1
Total .. ..	568.3	45.3	

Applying these budget/estimate percentages to the proposed provision for DRF credit due to released material is worked out as follows :

† Obtained from the Railway Board.

@ Current depreciation 234.9  
1/10 of back log. 143.2

Total .. .. Rs. 378.1 crores  
(Cols. 6 and 3 of item No. 2(i) of Table 1.9)

• 25% of Rs. 378.1 crores.

† 1.1% of Rs. 836.9 crores.

Plan head	Amount provided in the budget for 1982-83 for DRF	Credit on account of released material provided for 1982-83	Percentage (3) — × 100 (2)
1	2	3	4

#### Proposed appropriation to DRF

1. Track renewal	378.1 @
2. Other than track renewal	836.9
Total .. ..	Rs. 1,215.0 crores††

#### Anticipated credit due to released material

1. Track renewal	94.5 *
2. Other than track renewal	9.2 †
Total .. ..	Rs. 103.7 crores

Annexure-A. 1.20  
(Cf. Para 10.5)

#### Annual amount (gross & net) required for wiping out the arrear of renewal and replacement.

(Rupees in crores)		
Item	Gross§	Net**
1. Track renewal	1,432.2	1,074.1
2. Other than track renewal	1,568.1	1,550.9
Total .. ..	3,000.3	2,625.0
	say 3,000.0	say 2,600.0
3. Annual amount to be provided in case the arrears are, on an average, to be wiped out in 10 years at prices on 1-4-1982.	300.0***	260.0***

†† Para 10.4.

§ Figures taken from Col. 3 Table 1.9.

\*\* Gross figure adjusted by taking credit due to released material at percentages indicated in Annexure A-1.1.19.

\*\*\* These figures will have to be adjusted for price variations from year to year.



## CHAPTER II

### DEVELOPMENT FUND

#### 1.0. Introduction.

1.1. The Development Fund (DF) was created with effect from 1 April 1950, merging in it the existing Railway Betterment Fund (RBF).\*

1.2. The scope of DF was changed from time to time. Presently it bears expenditure on the following types of works :

1. Amenities for all users of rail transport—DF 1
2. Labour welfare works each costing —DF 2 more than Rs. 1 lakh.
3. Unremunerative works for operating—DF 3 improvement each costing more than Rs. 10 lakhs.

#### 2.0. Financing of DF.

2.1. DF was initially created out of the annual surplus of the Railways.

2.2. With effect from 1 April 1955, the scope of DF widened whereby certain new items of expenditure earlier charged to revenue and capital, were added in the list of works to be financed from it. It was, however, apprehended that if the Railways had to pay full dividend to the General Revenues, no funds would be left to be appropriated to DF for financing development expenditure.

2.3. RCC, 1954, were anxious that paucity of funds should not impose restraints on development and that there should be no neglect of this important aspect of railway operation. It was accordingly decided by RCC, 1954 that in the event of DF not being in a position to meet the expenditure from its own resources, money should be advanced from General Revenues to the Railways, such advances being treated as temporary loans on which the Railways would pay interest to the General Revenues. It was open to the Railways to repay this loan in instalments, if necessary, from accretions to the DF in the more prosperous years to liquidate the debt. This arrangement has been confirmed by successive Convention Committees.

#### 3.0. Loan liability of DF : a review.

3.1. The loan liability under DF at the end of 1981-82 was Rs. 224.17 crores. During 1982-83 it has been estimated in the Budget that an amount of Rs. 45.03 crores will be appropriated to the Fund from revenue surplus. This, along with an amount of Rs. 0.42 crores accruing as interest during the year will meet the estimated expenditure of Rs. 32.00 crores chargeable to the Fund as well as the liability of Rs. 13.45 crores for payment of interest on the outstanding loan from General Revenues. The loan liability at the end of 1982-83 will thus remain Rs. 224.17 crores.

3.2. We have reviewed the items charged to DF. What struck us was the switch-over of the allocation of non-gazetted staff quarters from Capital to DF and then back to Capital. On the other hand, the gazetted officer's quarters have always been charged to Capital. The changes made in the allocation rules from time to time are given in Table 2.1.

Table 2.1

Changes made in the rules of allocation

Category	Period				
	Upto 31 March 1946	1 April 1946 to 31 March 1950	1 April 1950 to 31 March 1955	1 April 1955 to 31 March 1974	1 April 1974 onwards
	1	2	3	4	5
Gazetted staff quarters	Capital	Capital	Capital	Capital	Capital
Class III staff quarters.	Capital	Capital	Capital	DF	Capital
Class IV staff quarters.	Capital	RBF	DF	DF	Capital

3.3. The cost of non-gazetted quarters was earlier met out of Capital. The allocation was changed to DF with a view to arrest over-capitalisation and at a time when Railways were able to build up DF out of their own surplus.

3.4. The position materially changed from 1967-68, when the expenditure chargeable to DF had to be largely financed from temporary loans from the General Revenues. Because of the unsatisfactory position of DF it was not possible for the Railways to expect any substantial allocation from DF for the construction of staff quarters for non-gazetted staff.\*\*

3.5. The practice in the public sector is also to charge the cost of quarters to Capital.

3.6. The Wanchoo Committee on Accident Enquiry, 1968 had made a specific recommendation† that larger provision for housing of the railway employees was necessary and that this amount should come from Central sources free of interest liability :

“It has been suggested that to the extent money is spent on housing of staff, the Railway Administration should get relief from payment of interest on Capital. In this manner, it may be possible to accelerate the rate of building of quarters substantially and housing the staff within a few years. In our view, there is considerable strength in this plea, and we would urge the Government to give this matter their closest consideration.”

\* RBF was started with effect from 1 April 1946 to relieve Capital of charges relating to work for provision of amenities for passengers and staff and expenditure on operating improvements costing not more than Rs. 3 lakhs each. With effect from 1 April 1949, the scope of RBF was curtailed to meet only the expenditure on amenities for passengers.

\*\* It would have been in the fitness of things if the switch-over in

the allocation was made around 1967-68 instead of 1974-75.

† Para 74 of the Justice Wanchoo Committee's Report —Pt. II. The Railway Accident enquiry Committee (Justice Sikri Committee), 1978 held similar views - Paras 163 to 168 of Pt. I of their Report.



3.7. The matter was considered by RCC, 1973 and it was decided that with effect from 1 April 1974 the cost of non-gazetted staff quarters should be charged to Capital instead of to DF. RCC, 1973 also recommended that on such Capital, dividend should be payable only if the Railways have surplus after discharging other dividend obligations.

3.8. According to normal practice, the correct allocation of all types of quarters, for gazetted or non-gazetted personnel is from Capital. It is also not desirable to have two sets of quarters, one charged to DF and the other to Capital. The change for temporary periods from Capital to DF has cast an avoidable burden on DF, and in a sense crippled it from discharging its rightful responsibilities. We accordingly recommend that the cost of quarters charged to DF in the past should be written back from DF to Capital. This write-back would be similar to the adhoc adjustment made from DF to Capital of the cost of new unremunerative lines under construction on 1 April 1955.\*

3.9. The cost of quarters for which write-back has been recommended above adds up to Rs. 130.47 crores. The railway-wise break-up is given in Table 2.2†.

Table 2.2

Cost of quarters charged to DF : Railway-wise break-up.

(Rupees in crores)

S. No.	Railway	††Improvement and alterations to existing quarters to whatever type	Class IV staff quarters	Class III staff quarters
1.	Central	0.84	4.52	9.59
2.	North Eastern	1.83	3.06	4.98
3.	Southern	1.27	3.05	4.31
4.	South Central	0.79	2.41	5.99
5.	South Eastern	2.84	9.28	11.54
6.	Western	1.02	5.75	8.60
7.	Northern	1.96	6.13	10.50
8.	Northeast Frontier	1.53	...	12.59@
9.	Eastern	1.95	4.24	9.90
Total :		14.03	38.44	78.00
Grand total : Rs. 130.47 crores.				

3.10. On implementation of this recommendation, the loan liability of DF would get reduced from the budgetted figure of Rs. 224.17 crores to Rs. 93.70 crores. This will also reduce the interest liability of the Railways by about Rs. 7.8 crores\*\* per annum.

\* Unremunerative new lines were initially charged to DF. Later, the rules were revised from 1 April 1955 and all new lines, whether remunerative or not, were charged to Capital. The ad hoc adjustment was recommended by R.C.C., 1960.

† Source : Capital Revenue Accounts for the year ending 31 March 1978 (Financial Statement No. XX).

● This is for both Class III and Class IV quarters and separate break-up is not readily available.

†† RCC, 1980 has agreed to charge fresh expenditure on provision of fans and other amenities in Type I and Type II Quarters constructed prior to 1-4-1974 to capital instead of to D.F.

#### 4.0. Rate of dividend on the cost of quarters.

4.1. We have also looked into the question of the rate of dividend payable to the General Revenues on the staff quarters charged to Capital.

4.2. Initially, there was no concession in the rate of dividend to be paid to General Revenues on the staff quarters charged to Capital. It was only from 1 April 1974 that RCC decided that on such Capital, the dividend should be payable only if the Railways have surplus after discharging other dividend obligations.

4.3. The Expert Group on the Capital Structure of Indian Railways, 1978 had reviewed the position and had brought out that while over 40 per cent of the other Central Government employees were provided with the Government quarters in Delhi, only 15 per cent of the railway staff were housed in the metropolitan cities of Bombay, Calcutta, Delhi and Madras. With a view to improve housing for railway staff, the Expert Group had recommended that the allocation of staff quarters may remain 'Capital'; but the dividend payable should not exceed 3.5 per cent, since the return on railway houses is around 3 to 3.5 per cent and since the Railways retain the rent recovered.

4.4. RCC 1977† accepted the suggestion of the Expert Group and recommended that on the Capital cost of residential buildings from 1 April 1978 the dividend should be paid at the rate of 3.5 per cent. RCC's recommendations were approved by Parliament.

4.5. We feel that the rationale of fixing the rate of dividend at 3.5 per cent i.e., at par with the return on staff quarters needs to be considered afresh. This is because the expenditure on maintenance of residential buildings exceeds the rent recovered. The gap gets widened if the element of depreciation is also taken into account. The year-wise position for the years 1977-78 to 1979-80 is given in Table 2.3.

Table 2.3

Rent recovered vis-a-vis expenditure on maintenance of quarters.

(Rupees in crores)

Year	Rent recovered§	Expenditure on maintenance of residential buildings§§
1	2	3
1. 1977-78	10.9	14.4
2. 1978-79	11.7	17.7
3. 1979-80	12.2	17.2

\*\* From 1 April, 1978, interest is charged at the rate applicable to State Governments. For 1982-83 this rate is 6.25 per cent, with a rebate of 0.25 percent for prompt payment.

§ Capital and Revenue Accounts of Residential Buildings.

§§ Expenditure booked under abstract 'J' (511 to 514) demand No. 1 (This does not include depreciation).

† RCC, 1977 was in position till August 1979, when it became 'functus officio', on dissolution of Lok Sabha.



4.6. Since the rent recovered does not meet the cost of maintenance, the return which the quarters yield is negative.

4.7. We, therefore, recommend that no dividend need be paid on the capital cost of residential buildings. This, together with adequate allotment of funds under the plan-head 'staff quarters', will step up the annual rate of construction of residential buildings and meet the recommendations of the Wanchoo and Sikri Accident Enquiry Committees.

4.8. The dividend paid year-wise to the General Revenues on the capital cost of residential buildings from 1978-79 to 1980-81 is given in Table 2.4.

Table 2.4

**Dividend paid to General Revenues on cost of quarters.**

(Rupees in crores.)

Year	Capital cost of residential buildings on which dividend has been paid.	Dividend paid to General Revenues
1978-79	71.39	2.49
1979-80	91.86	3.21
1980-81	104.03	3.64

4.9. The acceptance of this recommendation will imply a reduction in the annual dividend liability by about Rs. 3.6 crores\* at the present level.

#### 5.0. Appropriation to and withdrawals from DF.—

5.1. Appropriation to DF is from :

1. Revenue surplus left after payment of dividend to General Revenues.
2. Loans from General Revenues.

5.2. The withdrawals from the fund are used for :

1. Payment of loans taken from General Revenues and interest thereon.
2. Financing works chargeable to DF.

5.3. The year-wise appropriations to and withdrawals from DF from 1967-68 onwards are indicated in Table 2.5.

Table 2.5

**Year-wise appropriations to and withdrawals from DF.**

Year	Appropriation to DF from		Withdrawal from DF for		
	Revenue surplus	Loan from General Revenues	Works	Repayment of loan	Interest on loans
	2	3	4	5	6
1967-68	...	11.24	19.15	...	0.24
1968-69	...	14.06	16.59	...	0.80
1969-70	...	18.14	17.08	...	1.52
1970-71	...	21.58	18.23	...	2.46
1971-72	9.21	21.62	20.82	...	3.52
1972-73	2.92	15.72	21.49	...	3.71
1973-74	...	22.65	19.39	...	4.69
1974-75	...	21.90	16.17	...	5.99
1975-76	...	22.34	16.32	...	7.33
1976-77	25.86	...	17.62	...	8.24
1977-78	34.61	...	26.22	...	8.39
1978-79	34.68	5.37	25.94	...	8.74
1979-80	...	31.59	27.82	...	9.25
1980-81	...	34.66	29.76	...	11.24
1981-82 (RE)	46.13	...	27.74	...	13.45
1982-83 (RE)	45.03	...	32.00	...	13.45
Total	198.44	240.87†	352.34	...	103.02

Source 1 Annexure A (page 70 of Memoranda to RCC 1973 by Financial Commissioner (Railways).

1973 by Financial Commissioner (Railways).

2. Appropriation Accounts of Railways in India for 1980-81 (Pt. II)—Statement at page 68.

5.4. The Committee note that now about Rs. 30 crores§ are spent per annum on works chargeable to DF. As against this, the outlay required to complete the works under DF is about Rs. 88 crores††. The Railway-wise position is given in Table 2.6.

Table 2.6

**Railway-wise position of works in progress**

(Rupees in crores)

Railway	DF 1	DF 2	DF 3	Total
	‡	‡	‡	
1. Central	0.42	1.10	8.79	10.31
2. Eastern	0.12	1.51	12.88	14.51
3. Northern	0.76	1.37	5.51	7.64
4. North Eastern	0.85	0.98	17.55	19.39
5. Northeast Frontier	0.09	1.28	0.96	2.33
6. Southern	0.86	1.77	7.95	10.58
7. South Central	1.29	4.13	3.91	9.32
8. South Eastern	0.06	0.69	6.62	7.37
9. Western	0.08	1.30	4.92	6.30
Total	4.53	14.13	69.09	87.75

\* Subsidy of about Rs. 32 lakhs is claimed from General Revenues on residential quarters on N.F. Railway.

† Out of the loan liability of Rs. 86.5 crores at the beginning of 1972-73, an amount of Rs. 16.7 crores was wiped out on pro-forma basis from out of the arrears reliefs in payment of dividend for the years 1969-70 and 1970-71 recommended by the Railway convention Committee, 1971. Taking this into account, the loan liability from General Revenues is now Rs. 224.17 crores (240.87—16.7).

§ Out of this, an amount of Rs. 5 crores is earmarked for amenities for users of Railway transport.

†† This is as per 1982-83 Budget documents. In some cases the costs shown in the Budget documents are not the latest costs which actually may be much higher.

‡ DFs 1, 2 and 3 explained vide para 1.2 ante.



5.5 The outlay required to complete the works is about three times the annual allotment of funds. With this ratio, it would take three years to complete the on-going works, if during this period no new is added. Since there are cost over-runs and some new works get included in the budget every year, the period of completion will be more than three years.

5.6. There are 850 on-going works chargeable to DF. Out of these, 18 works are over Rs. 1 crore each, costing in aggregate Rs. 41 crores. Most of the works are small in value, and the Railways should be in a position to complete them in a year or two. The existing situation in which the average period of completion will be more than 3 years, is unsatisfactory and will lead to escalations in cost and difficulties in monitoring the progress.

5.7. This situation can be remedied only by :

1. Through scrutiny of the utility and essentiality of the works from the Railways operational point of view.
2. Allotment of adequate amount under DF.

#### 6.0 Review of high-value works.

6.1. It is true that the works chargeable to DF are unremunerative, but at the same time it is necessary to exercise some scrutiny to establish their essentiality to the basic task of transportation so that the scarce resources are not frittered away on non-essential works and the Railways are not burdened with recurring losses. Such a probing scrutiny and an in-depth examination is specially necessary for high-value works.

6.2. By way of illustration, it would be adequate to mention the following two cases:

1. Conversion of Kashipur-Lalkua MG line into BG (60.75 kms.) and construction of a parallel BG line between Lalkua and New Haldwani (11.27 kms.) Cost : Rs. 9.08 crores.\*
2. Conversion of Moradabad-Ram Nagar MG line into BG (77.5 kms.). Cost : Rs. 7.50 crores.\*

6.3. Both these works were included in the budget for 1977-78 to provide BG links to the hill areas of UP for development of tourism and forest-based industries. These works are highly unremunerative, yielding a minus return.

6.4. The outlay provided in the budget for these works is shown in Table 2.7.

Table 2.7

#### Funds allotted for Kashipur-Lalkua and Moradabad-Ram Nagar conversions.

Particulars	(Rupees in thousands)					
	Funds allotted					
	1977-78	78-79	79-80	80-81	81-82	82-83
1	2	3	4	5	6	7
1. Kashipur-Lalkua conversion. Cost Rs. 9.08 crores.	1	2.00	1	10.00	1	5.00
2. Moradabad-Ram Nagar conversion. Cost Rs. 7.50 crores.	9.99	17.97	1	1.00.00	1	5.00

\* These were the costs included in 1977-78 budget. The current costs will be much higher.

† One of these works is doubling between Dum Dum Junction and Barasat on Eastern Railway at a cost of Rs. 7.6 crores and another is for intensification of suburban services ex. Churchgate at a cost of Rs. 7.1 crores.

‡ These will not include works such as computerisation of Rail-

6.5. We find that the expenditure so far incurred on Kashipur-Lalkua conversion is Rs. 50,000. This work has almost remained 'frozen' and its inclusion in the budget has been only a 'paper exercise'.

6.6. The amount so far spent on the other work, viz., conversion of Moradabad-Ram Nagar MG line into BG is Rs. 1.62 crores, and the outlay proposed for 1982-83 is only Rs. 5 lakhs. This work has also remained frozen for intermittent spells when only token amount of Rs. 1,000 was provided.

6.7. At this rate of availability of funds, these works have little chance of getting completed in the near future; the amount now allotted is hereby sufficient to meet the establishment charges and is, therefore, wasteful.

6.8. The Committee on Metre Gauge Operations 1979, set up by the Railway Board, had reviewed these projects and were not in favour of undertaking them, stating that on both these sections the utilisation was extremely poor and there was sufficient scope for increasing the capacity of the existing lines with improved inputs. We have already dealt with policy regarding this in detail in the Chapter on 'Transport Planning' in Part II of our Report submitted in October, 1982.

6.9. The Committee are of the view that works which are not essential from the Railways' operational point of view and are unremunerative should not be included in the budget. At the same time, there is a strong case for a thorough review and pruning of the on-going works lying more or less dormant in the budget papers and the works programmes. In such cases, unrealistically small expenditure is being incurred from year to year on establishment, survey, earthwork etc. and this is wasteful in nature.

6.10. The Committee note that out of 18 works-in-progress under DF over Rs. 1 crore each, there are 4 works† relating to augmentation of facilities on the suburban sections. Because of the inadequate Railway surplus, loans have to be taken frequently from General Revenues to finance works charged to DF. The funds under DF are, therefore, always limited, resulting in very slow progress of the works charged to this Head of Account. The Committee consider that there is a definite need to optimise the existing suburban services in the metropolitan cities in order to provide relief to the millions of commuters who use such services. This can only be done if the suburban works, whether remunerative or not, are charged to Capital instead of to DF. The Committee have also discussed in detail, in Part II of their report, about the formidable problems which the Railways are facing with passenger terminals. Unless adequate terminal capacities‡ are provided as an integral part of planning, the introduction of additional passenger trains would be extremely difficult, particularly on the quadrilateral and diagonal routes.\*\*

6.11. The Committee, therefore, recommend that even if the passenger terminal capacities are not found to yield a remunerative rate of return, they should be charged to Capital and not to DF as otherwise such works will take long time to complete which is

way Passenger System or works of additions and alterations to stations carried out by themselves. Such works should be justified and allocated according to extant rules.

\*\* The quadrilateral routes are those which connect Calcutta-Delhi, Delhi-Bombay, Bombay-Madras and Madras-Calcutta. The diagonal routes connect Calcutta to Bombay and Delhi to Madras.



undesirable. The Committee are conscious that these recommendations may result in some over-capitalisation; but this is unavoidable looking to the nature of works and the urgency for their execution.

6.12. The average period of completion of a work depends upon :

- .1 Outlay required to complete the on-going works,
- .2 Cost of the new works included in the budget, and
- .3 The funds allotted.

The relationship, among these three factors, is indicated in Table 2.8.

Table 2.8

**Period of completion vis-a-vis the throw-forward and funds allotted.**

<i>Average period of completion (in years)</i>	<i>Rate of outlay required to complete ongoing and new works to the funds allotted.</i>
2	1.6
3	2.1
4*	2.7
5	3.3

6.13. In the above relationship, it has been presumed that the funds allotted in a particular year equal the cost of new works added in the budget for that year.

6.14 Since most of the works charged to DF are small works, it should be possible to physically complete them within a year or two, and hence the ratio should not exceed 1.6. Keeping this in view and the present throw-forward liability of Rs. 88 crores, the Committee recommend that the level of allotment under DF should be suitably raised, and that the government should be more selective about including appropriate works in the budget.

## 7.0. Conclusion

7.1. The correct allocation of residential quarters being Capital, the cost of quarters charged to DF in the past should be written back to Capital.

7.2. Since the maintenance cost of quarters is much more than the rent recovered from the occupants, payment of dividend on the cost of quarters is not justified.

7.3. The Government should be selective in including new works chargeable to DF. Unremunerative projects which are not needed from Railways' operational point of view should not be included in the budget.

7.4. The works connected with suburban traffic or for augmenting the passenger terminal capacities should

be charged to Capital and not to DF even if they are unremunerative. The funds under DF being limited, such a step is essential to take up and complete such works on high priority.

*Annexure A.2.1*  
(Cf. para 6.12)

**Period of completion vis-a-vis the ratio of outlay required to complete on-going works and new works to the funds allotted.**

The ratio worked out in Table 2.8 is based on the following assumptions :

- .1 Funds allotted in a year are equal to the cost of new works added in the budget of that year.
- .2 Phasing of expenditurc will be as under :

<i>Period of completion in years</i>	<i>Phasing of expenditure</i>
Two	40 per cent in first year 60 per cent in second year
Three	30 per cent in first year 30 per cent in second year 40 per cent in third year
Four	10 per cent in first year 30 per cent in second year 40 per cent in third year 20 per cent in fourth year
Five	10 per cent in first year 20 per cent in second year 20 per cent in third year 30 per cent in fourth year 20 per cent in fifth year

3. As an illustration, for a period of completion of 4 years, the expenditure incurred from time to time on the on-going works and new works added can be represented as under :

78-79	79-80	80-81	81-82	Throwfor- ward in 1982-83
0.1	0.3	0.4	0.2	..
	0.1	0.3	0.4	0.2
		0.1	0.3	0.6
			0.1	0.9
				<hr/> 1.7
ward in respect of on-going works				<hr/> 1.7
of new works.				1.0
required to complete the on-going				<hr/> 2.7
works.				<hr/> 1.0
lotted in the budget				1.0
the cost of new works)				
outlay required to complete the				2.7
and new works to the funds				<hr/> =2
				1.0

\* As an illustration, calculations are shown in Annexure A-2 1



## CHAPTER III

### RAILWAY PENSION FUND

#### 1.0. Introduction.

1.1. The Pension Scheme was introduced on the Railways from 16 November 1957. All staff appointed after this date are compulsorily covered by the pension rules. The staff who joined prior to 16 November 1957 have been given the option to opt for the pension scheme and a majority of them have done so.

1.2. Upto 1964, pension payments were shown as an item of working expenses in the accounts of the year year in which the payments were made. From 1 April 1964 a separate fund (Railway Pension Fund) was created to even out the variations in the amount to be paid from year to year and to provide for not only the current pension payments but also for the accumulated liabilities for the pension benefits earned by each year of service.

1.3. The Pension Fund is credited annually with appropriation from revenue (from Capital only in the case of production units). The accumulated government contributions together with interest thereon in respect of non-pensionable employees who opt for the pension scheme is also credited to this fund.

1.4. The Pension Fund should be self-sustaining and thus the balance in it on a particular date should represent the potential cumulative pensionary liability in respect of railway pensionable employees as on that date.

#### 2.0. Assessment made by the Government Actuary vis-a-vis the appropriation made.

2.1. The appropriation to the Pension Fund is to be made on the basis of assessments made by the Government Actuary\*. Though the Fund has been established from 1 April 1964, only two such assessments have been made till now, one in 1964 and the other in 1974.

2.2. The assessment made by the Actuary in 1964 was for an assumed population of 10 lakhs of railway servants coming into the scheme. According to this assessment, an annual contribution of about Rs. 29 crores\*\* was to be made towards the Pension Fund to build adequate resources for meeting future pensionary liabilities. It was also suggested by the Actuary that if the number of employees was different the amount could be worked out proportionately.

2.3. As against the advice given by the Actuary, the Railways appropriated to the fund sums as indicated in Table 3.1 (page 88) till 1974-75, the year when the report of the second Actuary became available.

\* Controller of Insurance, Ministry of Finance Insurance Division.

\*\* Rs. 20.78 crores for retirement pensions and Rs. 7.90 crores for family pensions. This amount did not include the cost of death-cum-retirement gratuity.

Table 3.1

#### Pension Fund : Annual Appropriation to and withdrawals from

(Rupees in crores)

Year	Appropriation to the Fund †	Withdrawal from the Fund
1964-65	12.00	2.21
1965-66	12.50	2.25
1966-67	14.00	3.77
1967-68	10.30	5.34
1968-69	10.30	6.37
1969-70	10.30	7.69
1970-71	15.50	8.65
1971-72	12.00	10.40
1972-73	16.72	10.46
1973-74	16.60	12.33
1974-75	16.60	18.98
	146.82	88.45

2.4. A revised actuarial assessment was made by the Government Actuary in December, 1974. This assessment was based on the data furnished by various Zonal Railways except South Eastern Railway and the Integral Coach Factory. It was estimated by the Actuary that the balance in the Pension Fund as on 31 March 1970 in respect of 4,57,862 employees and 42,956 pensioners, in respect of whom the data was supplied, should be Rs. 332.34 crores. This amount would have been higher if the employees of South Eastern Railway and the Integral Coach Factory had also been considered. The Actuary also assessed that the future rate of contributions in respect of each employee covered under the pension scheme should be 13.7 per cent of his salary. Salary includes all those elements which are taken into account in the computation of pension.

2.5. The actual balance in the Fund as on 31 March 1970 was only Rs. 80.02 crores, as against Rs. 332.34 crores assessed by the Actuary in December, 1974. The gap of Rs. 252.32 crores gets widened if the pensionary liabilities of the staff belonging to South Eastern Railway and Integral Coach Factory, for whom the data was not furnished to the Actuary, are also taken into account. No action was taken by the Railway Board to increase the balance under the Pension Fund to the level suggested by the second Actuary.

† This appropriation is from Revenue (Capital in the case of production units).

Source : Appendix XVI (page 97) of Explanatory Memorandum on the Railway Budget 1982-83.



2.6. It was also mentioned by the Actuary that if the actual contributions made to the Fund since 1 April 1970, fell short of the amount arrived at on the basis of 13.7 per cent of the salaries of the pensionable employees, the shortfall would have to be made good with interest. The Railways did not take any action to make good the shortfall.

2.7. From 1 April 1975, the Railways though did work out the amount that should have been appropriated to the Pension Fund as per the actuarial advice, the actual contribution to the Fund made was less for some years. This is indicated in Table 3.2 (page 90).

Table 3.2

**Pension Fund : Actual Contribution vis-a-vis recommendations of the Actuary**

(Rupees in crores)

Year	Contribution** on the basis suggested by Actuary@ 13.7% of pay	Contribu- tions† actuallly made	With- drawal*
1975-76	40.52	25.30	30.01
1976-77	46.44	35.90	40.25
1977-78	47.26	41.00	50.35
1978-79	61.59	51.00	62.96
1979-80	67.19	66.30	75.35
1980-81	73.30	86.50	105.57
1981-82	81.34	101.80	125.00
1982-83	88.86	152.00	135.00
	506.50	559.80	624.49

2.8. While the total contribution made during the period 1975-76 to 1982-83 were more than that recommended by the Actuary, the annual contribution was not according to the assessment made by the Actuary but generally depended upon the likely withdrawal from the Fund and the overall resource position of the Railways.

### 3.0. Balance in the Pension Fund.

3.1. As per the budget documents, the balance in the Pension Fund as on 31 March 1983 will be Rs. 389.4 crores.

3.2. It was estimated† by the Railway Board that as against the actual balance of Rs. 333.7 crores on 31 March 1981, the Fund should have a balance of Rs. 536 crores to meet the potential cumulative liability based on the actuarial advice. The contribution to Fund, therefore, fell short by Rs. 203 crores, as on 31 March 1981, even by standards laid down by the Railway Board.

3.3. The assessment made by the second Actuary that the contributions to the Pension Fund should be @13.7 per cent of the salaries of the employees is now out-of-date because of the following liberalisations that

have been place since the Actuary had submitted the report in 1974 :

1. Liberalisation in pension rates.
2. Treatment of portion of D.A. as pay for pensionary benefit.
3. Increase in the emoluments of railway employees consequent upon upgradations and restructuring of cadres.
4. Increase in the number of pension optees.
5. Increase in payments of additional pension reliefs.

If these factors are taken into account, the shortfall would be considerably in excess of Rs. 203 crores mentioned above.

3.4. The Committee note that the Railway Board have recently initiated action to review the previous assessment made by the Actuary in December, 1974. For this purpose, the Actuary has called for detailed information from the Railways in June 1982. Last time, it had taken the Railway Board a period of 3 years to obtain similar information from the Railways and compile the same in the form required by the Actuary and even then the South Eastern Railway and Integral Coach Factory could not supply the information in time. This exercise needs to be speeded up.

3.5. The shortfall in the balance under the Pension Fund should be made good by suitably enhancing the appropriation to the Fund over a period to be decided by the Ministry of Railways, keeping in view the quantum of shortfall involved. Also in future, the appropriation to the Fund should be made strictly in accordance with the actuarial advice.

### 4.0. Periodical Evaluation by the Actuary.

4.1. The actuarial advice should be taken periodically, say once in five to seven years, or at intervals to be decided in consultation with the Actuary. The periodic evaluation is necessary, as not only in the interim period the emolument structure and pension rules get modified but also the assumptions made in the actuarial calculations such as mortality, ill-health retirements, differences in ages of husbands and wives, age of the youngest child etc. may not correspond with the actual experience, necessitating adjustments.

### 5.0. Conclusions.

5.1. The Pension Fund should be self-sustaining. It is essential to follow the expert actuarial advice which should be taken periodically, over a suitable period of time. Also annual appropriation to the Fund should be made strictly in accordance with the actuarial advice.

5.2. The shortfall in the balance under the Pension Fund should be made good by suitably enhancing the appropriation to the Fund over a period to be decided by the Ministry of Railways, keeping in view the quantum of shortfall involved.

\* Source : Appendix XVI, page 97 of explanatory memorandum on the railway budget, 1982-83.

† Contribution from Revenue/Capital.

\*\* Evidence of Ministry of Railways before RCC, 1980 (Seventh Lok Sabha) Fourth Report.

‡ Evidence before RCC, 1980, 7th Lok Sabha Fourth Report, page:



## CHAPTER IV

### ACCIDENT COMPENSATION, SAFETY AND PASSENGER AMENITIES FUND

#### 1.0. Introduction.

1.1. The upper limit of compensation in the case of death or total disablement, caused in railway accidents, was raised in 1962 from Rs. 10,000 to Rs. 20,000. The payment of compensation was made according to a schedule which took into account the income of the deceased or the injured person at the time of the accident; the lower the income, the lower was the amount of compensation payable. The compensation then payable to the victims of air crash was Rs. 42,000 for each adult passenger and Rs. 21,000 for each minor.

1.2. The compensation limits for air crash victims were raised in April 1973 to Rs. 1 lakh for adults and Rs. 50,000 for minors. The maximum limit of compensation in the case of railway accidents was also raised\* from Rs. 20,000 to Rs. 50,000 from 14 December, 1973. This increase was considered necessary in view of the increased cost of living and also to meet the criticism that the earlier ceiling of accident compensation was too low compared to the limit applicable in the case of aircraft victims.

1.3. Simultaneously with the increase in the maximum limit, it was decided to pay compensation at uniform rates, doing away with the earlier system under which the amount of compensation was closely related to the earning capacity of the affected passenger. This was done to avoid elaborate investigations being made to determine the earning capacity of the passenger, resulting in considerable delays in settling the claims. The compensation is now related only to the type of injury suffered.

1.4. To enable the Railways to meet this enhanced liability, and also to take steps to make rail travel safer, it was decided to levy an extra charge on all passenger tickets with effect from 1 January, 1974. This is indicated in Table 4.1.

Table 4.1

#### Extra Charge on passenger fares

Type of ticket	Amount of extra charge†
Third class (now second class) (Suburban or non-suburban).	5 paise
Second class (since abolished) and Air-conditioned Chair Car.	10 paise
First class	50 paise
Air-conditioned class	Rs. 1.00
Second class (since abolished) and Third class (now second class) monthly season ticket.	25 paise
First class monthly season ticket.	Rs. 1.50
Quarterly season ticket	Three times the extra charge on monthly season ticket of the corresponding class.

\* The limit was raised under the Indian Railways (Second Amendment) Act, 1973.

† These rates are still in vogue.

\*\* For the year 1981-82, the rate of interest was 6.3 per cent.

1.5. The proceeds from the extra charge are credited to the Accident Compensation, Safety and Passenger Amenities Fund (ACSPF), which was created with effect from 1 April 1974.

1.6. The Fund is operated in three parts to cover expenditure on the following items :

Part A. Expenditure on payment of compensation arising out of train accidents.

Part B. Expenditure on certain specific safety items. Some of these are :

(i) Track circuiting or axle counters (including cost of new wooden sleepers);

(ii) Provision of lifting barriers at level crossings.

(iii) Railways share of road over/under-bridges in replacement of level crossings.

Part C. Expenditure on certain specific amenities for users of Railway transport, which are not charged to Development Fund. Some of these are :

(i) Provision of goods platforms and cover over goods platforms ;

(ii) Rest shelters for licensed porters;

1.7. The appropriation to and withdrawal from ACSPF and the closing balance from year to year is shown in Table 4.2

1.8. ACSPF is, therefore, anticipated to close with a balance of Rs. 37.22 crores by 31 March 1983. The balance in the Fund remains with the Ministry of Finance and earns interest.\*\*

Table 4.2

#### Appropriation to and withdrawal from ACSPF

Year	Appropriation to Fund			With- drawal	Net accretion during the year	Closing balance
	From surcharge on pas- senger	Interest	Total			
1974-75	6.65	26	6.91	17	6.74	8.50
1975-76	7.90	64	8.54	84	7.70	16.20
1976-77	8.98	1.07	10.05	1.68	8.37	24.57
1977-78	10.00	1.52	11.52	3.90	7.62	32.19
1978-79	9.90	1.90	11.80	6.85	4.95	37.14
1979-80	10.21	2.25	12.44	7.70	4.74	41.88
1980-81	10.50	2.27	13.04	11.01	2.03	43.91
1981-82§	11.58	2.66	14.24	15.03	(- )79	43.12
1982-83§§	11.91	2.53	14.44	20.34	(- )5.90	37.22

For the year 1982-83, the rate of interest is 6.6 per cent.

§ Revised estimate.

§§ Budget estimate.



## 2.0. Enhancement of the upper limits of compensation.

2.1. The break-up of the amount withdrawn from ACSPPF under (i) Accident compensation; (ii) Safety works; and (iii) Rail User's amenities works is given in Table 4.3.

2.2. When the Bill to raise the limit of Rs. 20,000 to Rs. 50,000 was introduced in Parliament in December 1973, there was a demand to remove the disparity between the amount of compensation paid by the Indian Airlines to the victims of air-crash and that paid by the Railways as in both cases it was a human life which was involved. In reply the then Minister for Railways mentioned that the raising of limit from Rs. 20,000 to Rs. 50,000 was an improvement and so far as human life was concerned, no amount of compensation would be enough. He also stated that it might be possible to raise the limit to Rs. 1 lakh after a year or two.

Table 4.3

### Withdrawal from ACSPPF

(Rupees in lakhs)				
Year	Accident Compensation.	Safety works	Amenities for users	Total
1974-75	12	5*	..	17
1975-76	51	32	1	84
1976-77	30	1,23	15	1,68
1977-78	51	3,30	9	3,90
1978-79	70	5,81	34	6,85
1979-80	16	6,87	67	7,70
1980-81	38	10,11	52	11,01
1981-82 (RE)	4,02	10,90	11	15,03
1982-83 (BE)	3,34	16,90	10	20,34

2.3. With effect from 19 July, 1980 Indian Airlines raised\*\* the amount of compensation payable to passengers on domestic sectors as under :—

1. Compensation for death or total disablement entirely preventing the person from carrying out his normal activities. Rs. 2 lakhs if the passenger is 12 or more years of age and Rs. 1 lakh if the passenger is below 12 years of age on the date of the accident.
2. Compensation for temporary disablement. Limited to a sum of Rs. 200 per day that the passenger is prevented from attending to his normal business or occupation subject to a maximum of Rs. 40,000.

2.4. There has been considerable increase in the cost of living since December, 1973 when the maximum limit of compensation in the case of railway accidents was fixed at Rs. 50,000. Indian Airlines have also increased the amount of compensation payable in the case of

victims of air crash. We have carefully considered all these aspects and are of the view that the existing maximum limit of Rs. 50,000 may be revised as under :

1. Passenger of 12 years of age Rs. 1 lakh and above.
2. Passenger below 12 years of age Rs. 50,000.

The compensation limits for injuries should also be revised mutatis mutandis.

2.5. At the time the Bill was introduced in December, it was anticipated that the expenditure on account of compensation will be approximately Rs. 2.5 crores per annum and the amount of extra charge collected would be around Rs. 6 crores. Compared to this estimate, the amount of accident compensation paid has been consistently less than Rs. 1 crore till 1980-81. It was only in 1981-82 that the amount of compensation paid was about Rs. 4 crores. The proceeds from the extra charge have steadily increased from Rs. 6.6 crores in 1974-75 to Rs. 11.6 crores in 1981-82. The amount collected from passengers by way of extra charge is therefore, now more than the earlier estimate of Rs. 8 crores, and barring last two years, the accident compensation paid was also less than Rs. 1 crore as compared to the estimated amount of Rs. 2.5 crores. Looking to this position, we are of the view that the Railways should be able to pay the increased limits of compensation recommended by us without enhancing the extra charge levied on the passengers.

## 3.0. Scope of ACSPPF.

3.1. ACSPPF, as it stands constituted, is also used for financing works related to amenities for users of railway transport. The amount spent on such works varied from Rs. 0.73 lakhs in 1975-76 to Rs. 66.78 lakhs in 1979-80. The main objective of creating this Fund was to pay compensation to the victims of accidents and to minimise the incidence of accidents by providing safety works. We are of the view that it is not appropriate to use such a Fund on amenities such as, provision of goods platforms, rest shelters for licensed porters, etc. This dilutes the main objective of creating this Fund. We recommend that the expenditure on amenities for users of railway transport should be charged to Development Fund, which already bears expenditure on similar works. The title of the Fund should accordingly be changed to accident Compensation and Safety Fund.

3.2. We have already focussed the attention of the Government to the tardy progress in the utilisation of the resources available in Railway Safety Works Fund/ for replacement of level crossings by over-bridges under-bridges and have recommended utilising this Fund to the optimum according to a time-bound programme. The cost of over-bridges/under bridges in replacement of level crossings is shared between the Railways and the concerned State Governments. While the funds required by the State Governments come from Railway Safety Works Fund, the portion of the cost to be borne by the Railways is met out of ACSPPF. In order, therefore, that such works are executed promptly in the interest of safety, it is essential that money is allotted under ACSPPF to the extent permitted by the balance in the Fund.

\* Safety works plus Passenger amenities works.

\*\* In the case of international passengers, the amount of compensation in the case of death or injury is limited to a sum of

US \$ 20,000 under Hague Protocol and US\$ 10,000 under Warsaw Convention, as the case may be. About 90 per cent of the countries have signed the Hague Protocol.



3.3. As we have mentioned, in para 15.2, page 32, in respect of DRF, the present system of adjusting annual withdrawal from ACSPF under the over-all Plan-ceiling has not worked well. This has in fact been counter productive in many cases, in as much as essential and rightful ACSPF works have frequently been elbowed out under the pressure of such works as new lines, doublings, terminal works etc. We therefore recommend that the withdrawal from ACSPF should be regulated by the Railways themselves in the way as advised by us for DRF.

#### 4.0. Delay in payment of compensation claims.

4.1. The Committee have studied the existing procedure of payment of compensation to the victims of rail accidents or their dependants and find the same complicated, cumbersome and dilatory. In the event of a major accident an ad hoc Claims Commissioner is appointed. The Commissioner invites applications from the victims or their dependants, examines the applicants, sends copies of applications to the Railways, fixes the date of hearing, frames issues, records evidence and gives his findings on each issue based on which payment of compensation is arranged.

4.2. The Committee note that in terms of Section 82 (C) of the Indian Railways Act, 1890, application for compensation is to be made to the Claims Commissioner by any dependant of the deceased. The word 'dependant'\* has the meaning assigned to it in Clause (d) of Section 2 of the Workmen's Compensation Act, 1923. This definition suffers from the following defects :—

- (i) Except when the 'dependant' is a widow, a minor legitimate son, an unmarried legitimate daughter, or a widowed mother, dependency of the applicant on the earnings of the passenger at the time of his death has to be legally established. This involves legal arguments from both sides (Railways and the applicant) and causes considerable delay in settling the claim.
- (ii) If the bonafide passenger dying in the accident was unemployed, the Railways are not legally liable to pay compensation if such a passenger does not leave behind a widow, a minor legitimate son, an unmarried legitimate daughter or a widowed mother. This is not a healthy feature and results in discrimination.
- (iii) If the passenger who has met his death in the Railway Accident leaves a number of dependants, some of whom are major and some minor, the compensation goes only to the minors to the exclusion of the major issues of the victim which again results in an unjustifiable discrimination.

4.3. The Committee are of the view that in the event the death of a bonafide passenger, liability of the Railways should be clear and enforceable for the benefit of the legal heirs of the deceased. They, therefore, recommend that the word 'dependant' occurring in Sections 82 (C) and 82 (HH) of the Indian Railways Act, 1890 be substituted by the words 'legal heirs' and the explanation to the aforesaid section 82 (C) be deleted. Ministry of Law may also be consulted.

4.4. No time schedule has been laid down for the appointment of an ad hoc Claims Commissioner. On reviewing a few cases, the Committee find that the time taken for such an appointment varies from few days to few months.

4.5. The expeditious payment of compensation claim depends, to a large extent, upon how quickly the Railways appoint the ad hoc Claims Commissioner set up accident claims cell and co-ordinate with the ad hoc Claims Commissioner so that the hearings could be started early and after the cases are decided payments could be made expeditiously. Laxity shown in this regard sets in a chain reaction which unduly delays settlement of compensation claims, leading to avoidable and justified dissatisfaction.

4.6. To enable the Ministry of Railways to appoint ad hoc Claims Commissioners promptly, the Committee recommend that State-wise or Zonal Railway-wise panels should be prepared and maintained in consultation with various State Governments and the Ministry of Law. The persons put on the panels should be those who are qualified for appointment as ad hoc Claims Commissioners in terms of the Railway Accidents (Compensation) Rules 1950, as amended from time to time. The consent of the person put on the panels should be obtained in advance. These panels can be reviewed periodically. Once a major accident take place, the Ministry of Railways may appoint any one person from the panels so maintained to be the ad hoc Claims Commissioner. This would eliminate the delay that takes place in searching out a suitable person for appointment after an accident has taken place, and in various consultations which can also be made when the panels are prepared.

4.7. The existing system needs to be revamped and for this the Committee recommend the following measures to avoid delays in the satisfactory settlement of claims :—

1. As already indicated, the word 'dependant' in the Indian Railways Act should not have the same meaning as assigned to it in the Workmen's Compensation Act. It should be replaced by 'legal heirs', as indicated in paragraph 4.3.
2. The ad hoc Claims Commissioner should be appointed from the panels suggested above. He alongwith his staff should be in position well within one month of the accident. Initially the appointment should be for a period of one year. The strength of the staff to be attached to the ad hoc Claims Commissioner should be predetermined. Once an accident occurs, staff as per the pre-determined strength should be promptly posted without any procedural delays.
3. The strength of the accident claims cell should like-wise be pre-determined. The provision of general ban, if any, to the creation of posts should not apply. As soon as an accident takes place, staff should be immediately posted in accordance with the predetermined sanctioned strength. The accident claims cell should ordinarily be set up even before the appointment of the ad hoc Claims Commissioner for making preliminary arrangements

\* According to the Workmen's Compensation Act, 1923, 'dependant' means any of the following relatives of the deceased workman, namely (i) a widow, minor legitimate son and unmarried legitimate daughter, or a widowed mother, and (ii) if wholly or in part dependant on the earnings of the workman at the time of his death, a widower, a parent other than a wide-

wed mother, a minor illegitimate son, an unmarried illegitimate daughter, a daughter legitimate or illegitimate if married and a minor or if widowed, a minor brother, an unmarried or widowed sister, a widowed daughter-in-law, a minor child is alive, or where no parent of the workman is alive, paternal grand-parent.



and to liaise with the Divisional Railway Manager in whose jurisdiction the accident occurs.

4. The accommodation, telephone facilities etc., required by the adhoc Claims Commissioner should be arranged promptly by the Divisional Railway Manager of the Division in which the accident occurs. If necessary, accommodation required should be taken on hire.
5. The reservation charts, ticket collector's registers, excess fare tickets and other relevant documents incorporating details of the victims should be immediately collected as these are of considerable help in establishing the bonafides of the passengers concerned. The railway official should guard against such records being destroyed. On setting up of the accident claims cell such records should be promptly handed over to them.
6. The Railway administration should post one or two Claims Inspectors at the site of accident immediately on receipt of information of an accident. These staff should later be assigned the work in the accident claims cell in the pre-determined strength.
7. The officers, staff and Railway Advocates employed should be sufficiently experienced and of proven ability. It depends very much on their initiative, integrity and judgement that the claims are settled timely and that the image of Railways in the eyes of the public does not suffer.
8. The appointment of Claims Commissioner, setting up of accident claims cell, progress of hearings and settlement of cases should be monitored at the General Manager's level.

#### 5.0. Payment to be made by crossed cheque or through fixed deposit.

5.1. The Committee have recommended increase in the amount of compensation to be paid in the event of death from Rs. 50,000 to Rs. 1 lakh. The compensation payable for injuries has also been recommended to be increased proportionately. The persons involved in the accident belong to different parts of the country and a large number of them are illiterate. The Committee are of the opinion that in order to eliminate malpractices, payment of compensation should be arranged by the General Manager of the Zonal Railway concerned within two weeks of the order of the ad hoc Claims Commissioner either by 'ACCOUNT PAYEE CHEQUE' or by depositing the amount in the name of the person concerned in 'Fixed Deposit' account with a Bank, preferably located in the area from which the recipient hails. The payment of compensation in no case be paid in cash which in the past has led to many malpractices. Accordingly, the Committee are of the opinion that Section 82 (G) of the Act be amended.

#### 6.0. Insurance of passengers.

6.1. The Committee have looked into the desirability of insuring Railway passenger services on the lines of third party risk insurance applicable to Indian Airlines.

6.2. On Indian Airlines, the statutory liability as laid down in the Carriage by Air Act, 1972, is fully

insured every year with the General Insurance Corporation of India, under a comprehensive liability policy, for an amount of Rs. 200 crores for any one event or accident to any one aircraft in a year. There is no system to appoint Claims Commissioner. The claims are settled by the Indian Airlines themselves except in rare cases where legal problems arise. Majority of the claims are settled within six months of the accident. The amount paid by the Airlines is reimbursed by the Insurance Company within about a month.

6.3. Indian Airlines cover their statutory liability by way of a comprehensive liability insurance policy because in the event of an accident involving a third party, the claim preferred against them could be too severe a burden for them to bear. This is not so in the case of the Railways. It may be difficult for the Railways to devise a machinery to settle the claims themselves, because they unlike the Airlines, carry both reserved and unreserved passengers, and in much larger numbers. People also travel without tickets on Railways which makes it difficult to determine the bonafides of the passengers.

6.4. Informal discussions with the officers of Oriental Fire and General Insurance Company Limited (a subsidiary of General Insurance Corporation Ltd.) have been held. The Insurance Company has given a tentative scheme\*, under which, they are prepared to enter into a covenant with the Railways for insuring Railways passenger services.

6.5. The alternatives given by Insurance Company for charging the premium are :

Basis	Premium for 1982-83 (Rupees in crores)
(i) Rs. 3 per thousand of the passenger revenue of Rs. 1000 crores.	3.0
(ii) Rs. 150 per million passenger kilometres, last available figures of Passenger kilometres, for 1980-81 viz., 2,08,588 million could be adopted.	3.1
(iii) One paise per passenger, adopting latest available figure of 3,612 millions for 1980-81.	3.6

6.6. The above premium will be doubled if the ceiling limits of compensation rates are raised to the level indicated by us. The premium rates quoted by the Insurance Company are subject to the following Low Claim Bonus :

Claim not exceeding	Renewal Discount
50%	25%
40%	35%
30%	45%
20%	55%
No claim	60%

6.7. Even though the premium suggested by the Corporation compares favourably with the compensation



of Rs. 4.0 crores paid in 1981-82 and the budget provision for Rs. 3.3 crores for 1982-83, it is considered excessive when compared to the compensation varying from Rs. 12.1 lakhs to Rs. 69.9 lakhs paid in years prior to 1981-82.\*

6.8. The Committee, are, however, not looking at the problem purely from a straight financial angle. The issue is one which very much concerns the image of the Railways in the eyes of the public. An insurance scheme, sound from an administrative point of view, and simple and quick in the procedure of application, would therefore merit serious consideration for adoption by the Railways.

#### 7.0. An appraisal of the Insurance Scheme.

7.1. None of the three alternatives presently offered by the Company is considered acceptable in its present form. A few of the essential features expected of such a scheme would include the following :

1. The drive undertaken by the Railways to reduce the scope and possibility of accidents as a result of safety works and promotion of safety consciousness.
2. The scheme should establish a direct relationship between the Insurance Company and the claimants, without the need for the Railways to work as an intermediary for either.
3. The scheme should cover both the major and minor accidents leading to death and injury.
4. The system should eschew the need for appointment of a Claims Commissioner or an adhoc Claims Commissioner.

7.2. The scheme given by the Insurance Company is, as rightly mentioned by them, 'only a frame-work of ideas subject to finalisation, amendments and improvement after discussions with the Railway authorities'. We, therefore, recommend that such discussions may commence seriously, and a blueprint of a workable insurance scheme formulated between the Railways and the Insurance Corporation, in consultation with the Ministries of Finance and Law. It is the opinion of the Committee that it should be possible to thrash out the inconsistencies in the present scheme and develop a comprehensive scheme which should be in the interest of the Railways, the Insurance Corporation and the rail user. A decision in the matter should be taken after a full examination of all relevant issues.

7.3. As for the interregnum the Railways may take immediate steps to streamline the present procedure on the lines indicated by us.

#### 8.0. Conclusions.

8.1. The existing limits for accident compensation should be raised without increasing the extra charge levied on the passengers.

8.2. The present system of payment of compensation should be revamped and the word 'dependant' re-defined, so that the liability of the Railway is clear and enforceable for the benefit of the legal heirs.

8.3. An efficient and workable Insurance Scheme should be formulated by the Railways and the General

Insurance Corporation, in consultation with the Ministries of Law and Finance and decision taken after complete examination of all relevant issues. As for the interregnum, the existing system should be streamlined.

*Annexure A-4.1*  
(Cf. Para 6.4)

#### Railway Passengers Personal Accident Insurance :

##### A Tentative Scheme given by Oriental Fire and General Insurance Company Limited.

#### Benefits:

A. As per Schedule attached.

B. Other benefits in addition to the disablement benefits which are provided in the schedule (Rule 6) of the Railway Act are :

- (1) Loss, destruction or deterioration of animals legally carried with the passengers or goods owned by the passenger in his compartment or on the train, sustained as a result of such accident.
- (2) Where more than one injury is caused by the same accident compensation shall be payable in respect of such injury provided that amount which would have been payable as compensation if the injured person had died a further balance amount for the difference will become payable.
- (3) The amount of compensation payable in respect of any injury other than injury specified in the schedule above resulting in pain and suffering shall be payable as the claims commissioner may in all circumstances determine to be reasonable (Maximum Rs. 10,000/-).

- Note:*
- (1) In no case the overall compensation for A + B will exceed Rs. 50,000/- per passenger.
  - (2) Minor children whether ticket-holders or otherwise will be entitled to 50% benefit as no ticket is issued to an infant up to 5 years but still he will be considered as a bonafide passenger travelling with the parents or guardians and therefore he will be entitled to the benefit.
  - (3) Free pass holders are entitled under the Act for the same benefits as any other passenger.
  - (4) Their own employees are also entitled to all these benefits either on the basis of W.C. Act schedule otherwise on the basis of the schedule of the Railway rules.

#### Premium:

There can be three basis of charging the premium.

(1) On the basis of the passenger revenue.—The premium to be calculated at the rate of Rs. 3/- per thousand of the passenger revenue of Rs. 1,000/- crores for the current financial year, subject to the Low Claims Bonus provisions as follows :—

<i>Not exceeding</i>	<i>Renewal Discount</i>
50 %	25 %
40 %	35 %
30 %	45 %
20 %	55 %
No claim	60 %

\* The year 1981-82 saw many serious railway accidents and, in the present context, should be considered as an exceptional year.



(1) The low claim discount will take care of the fear of the Railway about the disproportionate high premium. The Company will have no right to have the benefit of the increased in the fare and the base year will be taken as 1982-83 and if the freight structure is changed a proportionate adjustment in the percentage will be made on that basis.

(2) The second method could be passenger kilometres and these figures are published every year. We can base the estimated premium in the beginning of the year on the last available figures e.g. passenger kilometres for the year 1980-81 are 208588 million and we can charge a premium of Rs. 150/- per million passenger kilometres or part thereof subject to the same low claim average.

(3) The third method is to charge the premium per passenger originating irrespective of the distance travelled by them. It has been observed that average kilometres travelled by each passenger is about 58 kilometres and the total number of such passengers originating is 3612 millions in the year 1980-81. Therefore, we can charge a rate of one paise per passenger.

#### Not required to be covered :

Trespassing i.e. those travelling without tickets or those travelling on roofs will be treated as excluded categories of passengers. However, where under circumstances like train falling into the river and passengers being washed out and bodies subsequently recovered where it cannot be proved beyond doubt that whether a particular is a bonafide passenger or otherwise it will be considered by us that all the above categories of passengers as bonafide passengers for the purpose of compensation.

#### Procedure :

1. Immediately after an Accident the Railway authorities Divisional Headquarters and our Divisional Officers will be the central point in coordinating all efforts to collect relevant information and the Railway authorities will provide us the addresses of all their D.Os with the name of their three senior most officials, their office telephone and residential telephone numbers and we on our part will provide the D.Os' address, names of three senior most officials and official and residential telephone numbers.

2. On the occurrence of the accident it will be the duty of the D.O. of the Railways to inform our D.O. concerned either on phone in office or at residence and thereafter inform telegraphically.

3. The complete details of the prescribed proforma will be recorded as follows :—

- (i) names and address of all persons killed but who have been identified together with certification of the medical officer appointed for such purpose duly countersigned by the competent railway authority.
- (ii) In respect of un-identified dead persons, photographs as far as possible can be taken and if the injuries have mutilated and made them unidentifiable some identification marks whatever are available, details of the clothes or any other items on the body with approximate, age, bogies in which such passenger was travelling should also be noted. In all such cases it is suggested that on the basis of the

claims application, thorough investigation will be made from the place of residence or place of work and certification from the employer, the sarpanch and patwari if he belongs to a village and if he belongs to an urban area, the Member of the local body of that area and a second person like SHO of the area will be obtained by us through our organisation and/or with the cooperation of other Government organisations including Railways and after proper investigation if it is found that the man was travelling by the ill-fated train, it will be taken for granted that person had died in the accident.

- (iii) For persons who have been injured but who have died we cannot envisage much problem as the injuries can be immediately and properly certified by the medical officer of the hospital in which they will be hospitalised for the purpose of first treatment and subsequent treatment.

In relation to the loss of property (luggage) belonging to such passengers we envisage lot of problems in respect of those persons who are dead and cannot make any affidavit to the court. We cannot accept such claims without legally acceptable proof. In such cases we propose to fix a limit of Rs. 5000/- per passenger where either the damages luggage is not available for survey or it relates to currency notes, other valuables which are stated to have been lost. For all other luggage which can be assessed in damaged condition this limit of Rs. 5000/- will be applicable.

#### Discharge to the Company :

If the Railways wants us to make the payment of Compensation to the claimants directly they will have to authorise us to make direct payments to the dependants of the deceased or to the injured persons as the case may be.

Normally the law of the land will require the production of succession certificate but as per the Railway Act the Claims Commissioner like the W.C. Commissioner is competent to decide about the authorised dependents and distribute the compensation amongst them. If they continue to have the same machinery we have no objection to place at the disposal of the Commissioner our funds for such distribution. In case the Railway authorities decide to do away with the machinery or Claims Commissioner, we propose to deal as under :—

Payment of 50% on adhoc basis to the widow of the deceased immediately after proper identification and certification. The remaining 50% to be deposited immediately in the Bank in the joint name of the Company and the Widow so that the interest may be accrued for the benefit of such dependents and on receipt of a succession certificate or decision of any competent legal authority the amount may be released to such legal-heirs. If the widow is not alive and the deceased is an married person, then this 50% amount to be paid to the first category of legal-heirs. If there are no first category legal-heirs the amount will not be released without succession certificate.

This is only a frame-work of ideas subject to finalisation, amendments and improvements after discussions with the Railway authorities.



## THE SCHEDULE

(See Rule 6)

## Part I

Amount  
of Compensation

## Compensation Payable for Death and Injuries

Part I	Amount of Compensation (Rs.)	Part I	Amount of Compensation (Rs.)
For death	50,000	(x) For loss of terminal phalanx of thumb	10,000
(i) For loss of both hands or amputation of higher sites.	50,000	(xi) For amputation of both feet resulting in one bearing stump 3.	45,000
(ii) For loss of hand and foot	50,000	(xii) For amputation through both feet proximal to the metatarsophalangeal joint.	40,000
(iii) For double amputation through leg or thigh or amputation through leg or thigh on one side and loss of other foot.	50,000	(xiii) For loss of all toes of both feet through the metatarsophalangeal joint.	20,000
(iv) For loss of sight to such an extent as to render the claimant unable to perform any work for which eye-sight is essential.	50,000	(xiv) For loss of all toes of both feet proximal to the proximal interphalangeal joint.	15,000
(v) For very severe facial disfigurement.	50,000	(xv) For loss of all toes of both feet distal to the proximal interphalangeal joint.	10,000
(vi) For absolute deafness	50,000	(xvi) For amputation at hip	45,000
		(xvii) For amputation below hip with stump exceeding 5" in length measured from tip of great trochanter.	40,000
		(xviii) For amputation below hip with stump exceeding 5" in length measured from tip of great trochanter but not beyond middle thigh.	35,000
(i) For amputation through shoulder joint.	45,000	(xix) For amputation below middle thigh to 3.1/2" below knee.	30,000
(ii) For amputation below shoulder with stump less than 8" from tip of acromion.	40,000	(xx) For amputation below knee with stump exceeding 3.1/2" but not exceeding 5".	25,000
(iii) For amputation from 8" from tip of acromion to less than 4.1/2" below the tip of olecranon.	35,000	(xxi) For amputation below knee with stump exceeding 5".	20,000
(iv) For loss of a hand or a thumb and four fingers of one hand or amputation from 4.1/2" below tip of olecranon.	30,000	(xxii) For amputation resulting in one bearing.	15,000
(v) For loss of thumb	15,000	(xxiii) For amputation through one foot proximal to the metatarsophalangeal joint.	15,000
(vi) For loss of thumb and its metacarpal bone.	20,000	(xxiv) For loss of all toes of one foot through the metatarsophalangeal joint.	10,000
(vii) For loss of four fingers of one hand	25,000	(xxv) For loss of one eye, without complications, the other being normal.	20,000
(viii) For loss of three fingers of one hand	15,000	(xxvi) For loss of vision of one, without complications or disfigurement of eye ball, the other being normal.	15,000
(ix) For loss of two fingers of one hand	10,000		



## CHAPTER V

### SUMMARY OF RECOMMENDATION

#### Chapter I

##### Depreciation Reserve Fund

1. The arrear in renewal and replacement costing about Rs. 3,000 crores (gross) should be wiped out over a period of about ten years.

(Paras 6.10 and 14.2)

2. The amount of depreciation should take into account the inflationary and improvement elements. Otherwise, the Railways would be compelled to eat into their capital, and reported earnings/losses would be unrealistic.

(Paras 7.1 to 7.3)

3. The current cost of wasting assets is about Rs. 36,871 crores, as against the original value of Rs. 5,887 crores, annual depreciation expressed as a percentage of current replacement cost comes to 2.6%. On this basis the annual appropriation to DRF broadly works out as Rs. 1,110 crores including Rs. 260 crores to wipe out the arrears.

(Paras 9.0 and 10.0)

4. The amount of Rs. 1,110 crores will have to be updated every year to provide for (a) effect of price variation ; (b) contribution for the new assets added in the system. Looking to the variety of the assets on the Indian Railways and the uncertainties of the future. It is hard to prescribe a formula which could be straight-away applied to determine the effect of inflation. The Railways should work out the amount to be added on account of inflation on the basis of the trend of actual purchase prices. The amount to be provided for inflation should be reduced to the extent of interest accrued on the DRF balance.

(Para 11.0)

5. The amount to be appropriated to DRF every year should not depend on the varying amounts required to be withdrawn from the DRF from year to year.

(Para 12.0)

6. Every five years, a review should be carried out, current costs of replacements updated, and revised depreciation worked out.

(Para 13.0)

7. The withdrawal from DRF, as distinct from appropriation to DRF, should depend upon requirement of physical replacement and availability of material.

(Para 14.1)

8. The Railways should plan placing long-term orders and regularly use the capacity once developed. The contribution of adequate amount regularly to DRF and its consequences would encourage the industries to increase their production capacity and improve the quality of products.

(Para 14.3)

9. The amount to be withdrawn from DRF should be controlled by the Railways themselves.

(Para 15.0)

10. The Ministry of Railways should step up the appropriation to DRF from Rs. 500 crores to Rs. 809 crores in 1982-83, as already recommended in Part I of the Report. From 1983-84 onwards, the appropriations to DRF should be made at the level indicated in this report, viz., Rs. 1,110 crores (to be adjusted for price variations and for new assets added in the system).

(Para 16.3)

11. The stepping up of appropriations to DRF will necessitate increase in fares and freight. It is recommended that the amount of Rs. 260 crores (included in the figure of Rs. 1,110 crores) required to liquidate the backlog should not be considered for upward revision of fares and freight, as it will be unfair to burden the current users of transport by including this element in the freight and fare structure. Instead, General Exchequer should provide an equivalent amount of subsidy every year till the backlog is liquidated. Even if the remaining amount of Rs. 850 crores is taken as part of the cost, the increase in the fares and freight in one step may be too high. The Ministry of Railways may phase out the increase, though the appropriation to DRF should necessarily remain at the level of Rs. 1,110 crores per annum. Other measures for augmenting earnings and reducing working expenses will also have to be taken. Some of these aspects have been dealt with in Part II of our Report, while others will be dealt with in subsequent Parts.

(Paras 16.5, 16.6 and 16.7)

12. If for some reasons, the Railways are not able to pay dividend, attempt should not be made to do so at the cost of appropriation to DRF. On the other hand, the Railways' liability to pay dividend should be waived and the gap covered by public finance. We do not recommend this waiver in perpetuity but only for a maximum period of next five years during which the Railways should optimise their performance.

(Paras 16.8 and 16.9)

#### Chapter II

##### Development Fund

13. The cost of quarters charged to DF in the past should be written back from DF to Capital. With this, the loan liability will get reduced from Rs. 224.17 crores to Rs. 93.70 crores. The interest liability will also get reduced by about Rs. 7.8 crores per annum.

(Para 3.0)

14. No dividend should be paid on the Capital Cost of residential buildings. This, together with adequate allotment of funds under the Plan-head 'staff quarters', will step up the annual rate of construction of residential buildings and meet the recommendations of the Accident Enquiry Committees and also reduce the annual dividend liability by about Rs. 3.6 crores.

(Para 4.0)



15. Works connected with suburban traffic or for augmenting passenger terminal capacities should be charged to Capital and not to DF, even if they are unremunerative. As funds under DF are limited, such a step is essential to take up and complete such works on top priority.

(Paras 6.10 and 6.11)

16. Most of the items charged to DF being small works, it should be possible to physically complete them within a year or two. The level of allotment under DF should be adequately raised and the Government should be more selective in including new works in the budget.

(Para 6.14)

### Chapter III

#### Railway Pension Fund

17. The Pension Fund which is credited annually with appropriation from revenue (from Capital in the case of Production Units) should be self sustaining.

(Paras 1.3 and 1.4)

18. The actuarial advice should be obtained periodically to take into account changes in the Pension Scheme. Also if the assumptions made in the actuarial calculations such as mortality, ill-health retirement, differences in ages of husbands and wives do not correspond with the actual experience, necessary adjustments should be made at the time of the periodical review.

(Para 4.1)

19. The Railway Board should make up the arrears in the Fund by suitably enhancing the appropriations to the Fund. In future, the amount to be appropriated to the Fund should be strictly in accordance with actuarial advice.

(Para 3.5)

### Chapter IV

#### Accident Compensation, Safety and Passenger Amenities Fund

20. The existing maximum limit of Rs. 50,000 for accident compensation should be revised as under, without enhancing the extra charge levied on the passengers :

1. Passengers of 12 years of age and above. Rs. 1 lakh
2. Passengers below 12 years of age Rs. 50,000

The compensation limits for injuries should also be revised *mutatis mutandis*.

(Paras 2.4 and 2.5)

21. The expenditure on amenities for users of railway transport should not be charged to ACSPI. Such expenditure should be allocated to Development Fund, which already bears expenditure on similar works.

(Para 3.1)

22. The existing definition of 'dependent' results in an unjustifiable discrimination besides causing considerable delay in settling the claim. The word 'dependent' in the Indian Railways Act should, therefore, not be assigned the meaning given to it in the Workmen's Compensation Act, but be substituted by the words 'legal heirs' by making suitable amendments in the Act.

(Paras 4.2 and 4.3)

23. The existing procedure of payment of compensation to victims of rail accidents is very lengthy and needs to be revamped as recommended.

(Para 4.7)

24. To avoid malpractices, payment of compensation to the claimant should be made by the zonal railway concerned either by Account Payee Cheque or by depositing the amount in the name of the person concerned in a Fixed Deposit Account.

(Para 5.0)

25. A decision to cover compensation through the General Insurance Corporation may be taken after full examination of all relevant issues. For the interregnum, the scheme recommended by us for settling compensation claims may be enforced.

(Paras 6.0 and 7.0)

Sd./-  
Prof. Ravi J. Matthai

Sd./-  
Russi Mody

Sd./-  
Justice H.C.P. Tripathi

Sd./-  
V.P. Sawhney

Sd./-  
M. Satyapal

Sd./-  
H.C. Sarin  
(Chairman)

Sd./-  
Dr. S.K. Ray  
(Secretary)

8 November, 1982.





सत्यमेव जयते

भारत सरकार Government of India  
रेल मंत्रालय Ministry of Railways

# REPORT OF THE RAILWAY REFORMS COMMITTEE



सत्यमेव जयते

Part V

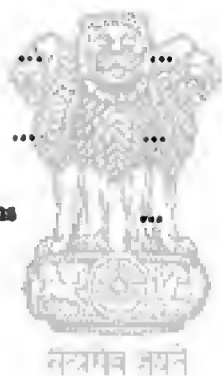
PRODUCTION AND MAINTENANCE  
OF  
ROLLING STOCK

DECEMBER, 1982



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## INTRODUCTION

The fleet of rolling stock, consisting of locomotives, coaches and wagons, constitutes the bulwark of the railway assets. The adequacy of this fleet, together with its efficient upkeep and optimum serviceability, are matters vital to the operation of the system. The issues pertaining to maintenance and manufacture of rolling stock have, therefore, assumed importance in our appraisal, investigation and deliberation.

In this Part of the Report, we have dealt with this subject. We have started this Report with an appreciation of the broad profile of the current and perspective problems. We have thereafter considered the subject in specific chapters on workshops, maintenance, production, quality assurance and exports.

We have covered all aspects relating to the maintenance of the very large and expanding fleet of rolling stock, and the issues pertaining to the maintenance and periodical overhaul of this fleet not only in the sheds and on line but also in the workshops.

We have come to a definite conclusion that the main thrust of maintenance on the Railways must be workshop-oriented. We have recommended a strategy attuned to such a systems-objective. We have done so in view of an appreciation of the fact that it is in the workshops that the requisite quality of machinery and skill can be available, and any attempt to transfer a portion of this work to the field is liable to be slipshod, inefficient and inadequate, with results deleterious to both fluidity and safety of operation.

The different issues pertaining to maintenance have been dealt with for locomotives, coaches and wagons, and specific recommendations have been made in respect of each kind of rolling stock. Since in Part II of our Report we have already recommended an accelerated phasing out of steam locomotives, we have, in this chapter, extensively covered diesel and electric traction.

We have identified certain areas where we have found the installed manufacturing capacity on the Railways

inadequate. We have already recommended in Part II of our Report that the Government should set up a second coach factory, and after fuller deliberations in this Part we reiterate the need for going about this on a priority, because any delay in this respect would increase the Railway's problems in geometrical progression. We have also emphasised our earlier recommendation about the need for setting up a second electric locomotives factory to supplement the total optimised production capacity of Chittaranjan Locomotive Works.

One major factor which has created serious complications in the performance of commuter services, particularly in Bombay and Calcutta areas, is the shortage of EMU rakes. We believe that it will be short-sighted to overlook this factor. The production capacity available in the country is not at all adequate to meet the growing requirements : we had estimated in Part II of our Report that suburban traffic is expected to be 160 billion passenger kms. in 2000 A.D. as against about 40 billion passenger kms. now. We have, therefore, recommended that a production unit exclusively for the manufacture of EMU rakes needs to be set up in India very urgently, failing which a major crisis will overtake the system responsible for running commuter services. We have added that this unit, for its optimisation of scale, should have a pronounced export bias.

Finally, we have dealt with matters relating to quality assurance, which on the Railways has many areas of weakness.

We have concluded the Report with a chapter on exports. The Committee believe that exports of Railway hardware in the shape of locomotives, coaches, EMUs, car sets and wagons can constitute an important element of India's exports.

We have, therefore, suggested a proper quantification of the export possibilities in Railway hardware for each Five Year Plan, and their fructification from year to year.



## CHAPTER I

### OVERVIEW

#### 1.0. Introduction.

1.1. We consider that beyond certain levels, productivity of assets rather than their numerical proliferation is the correct crucible of capacity. In this context, we are concerned to note that the neglect of maintenance in frastucture over a large number of years has had a serious effect on the productivity of the Railway workshops. The situation is so bad that the efficiency of maintenance has become vital factor affecting transport capacity.

1.2. Out of a total investment of Rs. 7,448 crores at the end of 1980-81, approximately Rs. 2,620 crores were accounted for by rolling stock, and another Rs. 450 crores\* by the units that manufacture, overhaul and repair this basic mobile sector of the Railways. This 42 per cent of the overall financial base has gone up from an estimated 25 percent in 1950-51, and reflects the growing importance of rolling stock in the overall investment planning of the Railways. Approximately, 5,77,500 personnel or one third of the total staff strength are involved in production, maintenance and technical aspects of operation.

1.3. Clearly, any strategy for the future that discounts the vital needs of the rolling stock fleet is fraught with grievous consequences. Yet, at this point of time, the ineffective percentages are higher than at any time since the first Five Year Plan and, in such an environment a type of operation with high trailing loads as recommended in Part II of our Report† cannot be effectively sustained.

1.4. Before we go into the weaknesses of the production and maintenance infrastructure, it will be helpful to get a bird's eye view of rolling stock holdings. Table 1.1 brings out the comparative position as at the end of 1950-51 and 1980-81.

Table 1.1

#### Rolling stock holdings

Item	Holding in 1950-51	Holding in 1980-81
Steam locomotives	8,120	7,469
Diesel locomotives	17	2,403
Electric locomotive	72	1,036
Electrical Multiple Units	460	2,625
Conventional coaches	18,780	35,634
Wagons (In Units)	213,283	400,946

Source : Railway Board's Annual Reports.

\* Estimated by the Secretariat of R.R.C.

† Cf. para 17, An outline of Strategy, in chapter II of our Report on Transportation and also para 9.2 of chapter VIII.

1.5. The table reflects only the change quantitatively. There has also been a substantial change in technology. This is illustrated by the fact that while the number of locomotives has increased by just 33 percent, their total tractive effort has risen by 102 per cent. Similarly, while coach and wagon holdings have increased by 98 per cent and 90 per cent respectively, their carrying capacity have risen by 133 percent in the former and 169 percent in the latter case. This reflects a pace of investment in rolling stock that has been quite high. Unfortunately, there is no evidence that a related commitment has also been made in the provision of the maintenance facilities and modernisation of the repair base. The Indian Railways are, therefore, confronted with a mismatched transportation base and the distortion will have to be ironed out before the present transport demand or the expected growth can be adequately looked after.‡

#### 2.0. Pre-1950 relevance.

2.1. Commencing with 1853, the Indian Railway system developed around a large number of individual companies and, in the early years, Government encouraged this multiplicity. Before 1897 when Government started taking over companies, there were as many as 175 separate organisations with route kilometres varying from several thousands to less than one hundred. Although the numbers reduced thereafter and from 1925 onwards Government started taking over management directly, even in 1949-50, the multiplicity of organisations was substantial. Each of these companies had to set up self-contained maintenance units. The Workshops thus varied violently in size and scope, and their layouts differed substantially, depending upon the experience of the officers of the Company and their affiliations in the U.K.

2.2. At the time of Independence, 45 workshops were inherited by the unified system from the Company Railways which had started coming under Government control from 1925 onwards. These workshops had workforces, each ranging from 150 to 15,000 men. It is relevant to note that inspite of increasing Government control, the unified national net-work was created in 1949-50 from 42 separate administrations.

2.3. The lack of uniformity in the workshops was matched by an equally bewildering variety of rolling stock designs because of insufficient standardisation between the various Company Railways. It was only in 1930 that a Central Standards Organisation was created, and a more specific standards discipline had to wait till the early Fifties when the RDSO\*\* was set up. As a result, 500 classes of Steam Locomotives had been operating in 1923, and, even in 1950, 377 still remained. The situation was compounded by the arrears of overhaul that had accumulated during the Second World War. To meet the priorities of war, steam locomotive overhaul had been cut by 33 per cent from about 1940 onwards, resulting in a backlog of around 30 per cent. For similar

‡ Para 3.2 and Chapter II quantify this aspect in greater detail.

\*\* Research, Designs and Standards Organisation.



reasons, POH arrears of 30 percent on coaches and 20 percent on wagons had accumulated. The stock was not only run down, but had aged beyond the rather liberally fixed codal lives. Even at the end of the First plan which concentrated on rehabilitation, on the BG, 33.4 percent of locomotives, 32.4 percent of coaches and 18 percent of wagons were overaged. On the MG, the position was worse, with 36 percent, 32.7 percent and 21.12 percent, respectively.

### 3.0. Developments since 1950.

3.1. Annexures A.1.1, A.1.2 and A.1.3 give the perspective of rolling stock holding over the past 30 years separately.\* The ineffective position is shown graphically at Annexures A.1.4, A.1.5, A.1.6 and A.1.7 for locomotives, coaches and wagons. It is interesting to follow the pattern of rolling stock ineffectives in relation to the age of stock and maintenance facilities. The age is reflected both by the percentage 'overdue replacement' and the mean length of service done by the entire holding. Maintenance facilities can be generally related to the percentage of stock overdue POH. The position is brought out for BG coaches and wagons in Annexure A-1.8. Because of the gradual changeover of steam traction to diesel and electric, there has been generally adequate POH capacity for steam locomotives. The overdue replacement status of the steam fleet has, however, been included in the annexure to give an idea of the arrears over the years.

3.2. It will be seen from Annexure A.1.8 that the ineffectives tend to rise and fall with the arrears of POH. During the first three Five Year Plans, the backlog of maintenance facilities was rapidly made up with a salutary effect on the availability of coaches and wagons. Simultaneously, there was a general reduction in the average age of the fleets. It may be mentioned that during the First Five Year Plan, the expenditure on maintenance facilities was about 9.4 percent of additional stock acquired. This had dropped to 4.1 percent by the Third Plan and a price has had to be paid for this in the later years.

3.3. The picture from 1973-74 onwards shows a general deterioration broken only by years when the disciplinary climate was markedly better. We realise that the staff discipline does have an effect on workshop out-turn, and the maintenance backlog does, to an extent, vary on this account. Nonetheless, the theoretical capacity has fallen far short of requirements.\*\* The trend of deteriorating availability can be arrested only by bringing the workshop capacity back in step with the arisings.@ A planning process which proceeds by piecemeal clearance of proposals and does not correlate investment on assets to the infrastructure required to maintain them, must lead to the kind of imbalance that the railways find themselves in today.

3.4. A mention may be made here of the physical inputs during the first few Plan periods. A workshop Enquiry Committee which had been set up in the early Fifties, in the face of the serious situation which existed then, had made an inventory of the then capacities. The conclusions are revealing.

#### 3.5. It found that :

1. The steam locomotive POH capacity, which

was already slightly in excess of arisings could be raised by another 10 percent by marginal balancing facilities.

2. Expansion of the existing workshops at Parel, Lalaguda, Perambur, Hubli, Gorakhpur and Izatnagar would raise the capacity to 2,769 locomotives per annum, which exceeded the anticipated arisings even at the end of the Second Five Year Plan. (In fact, the steam locomotive POH requirement never exceeded 2,700 at any time, as the holding started declining after reaching a peak of 10,810 in 1963-64).

3. On the coaching side, the committee found a shortage of POH capacity of 3,000 four-wheeler units, but said that six of the existing BG workshops and five existing MG workshops could be expanded without much difficulty to make up the shortage. A capacity shortage of POH of 7,000 four-wheeler units per year for wagons was also rapidly made up by the expansion of the existing works. Only one new combined Carriage and Wagon Workshop was proposed at Bongaigaon on the Northeast Frontier Railway.

3.6. There is an object lesson in these figures. In pre-independence India, sufficient capacity and cushions had been built into the existing Workshops to rapidly meet unusual circumstances. Not only could the backlog as a result of the Second World War be quickly overcome, but, the existing workshop network was by and large sufficient to meet a situation arising from expansion of rolling stock holding to the extent of about 45 percent between the years 1950-51 and 1960-61. It has already been mentioned\*\*\* that during the First Plan, the investment in maintenance facilities equalled about 9.4 percent of the expenditure on additional rolling stock, after which there was an increasing shortfall.

3.7. Nothing brings this out better than the fact that the Workshop Enquiry Committee of 1954 mentioned that about Rs. 4 crores worth of machinery and plant was purchased annually in the first few years of the Fifties. It is noteworthy that at the end of the Seventies when the rolling stock fleet had almost doubled the expenditure averaged hardly Rs. 8.5 crores which, in real terms, was less than fifty percent of the investment being made 30 years earlier. This has resulted in a piquant situation in which the Railways now find that 77 percent of the machinery and plant in the workshops is overaged. Even in 1952, this figure was relatively better at 46 percent despite the war time pressures.

3.8. The rising trend of ineffectives is only a-part of the present crisis of rolling stock efficiency. Of equal importance from the viewpoint of transportation throughout, is reliability in service. Locomotives have not been able to achieve even fifty percent of reliability targets on the BG, and, while the position on the MG is somewhat better, it fluctuates violently from year to year. In 1980-81, there were approximately 7,175 locomotive failures. Even on diesel and electric loco-

\* The orthodox definition of ineffective is non-availability for a full calendar day on maintenance accounts. Unfortunately, the system of data collection and codification does not inspire confidence that the figures are fully correct.

\*\* See Chapter II, para 24.

@ This aspect is covered in greater detail in Chapter II.

\*\*\* Paragraph 3.2 ante.



motives, the number of failures exceeds sixteen per day.\* On the coaching and wagon side there is a poor data base, and only the number of hot axles is recorded with reasonable accuracy. With figures of about 3.3 per 10,000,000 wagon km. and 0.41 per 10,000,000 coaching vehicle km. the situation is quite unchanged over the past few years. Some estimates put the loss of line capacity on account of rolling stock failures as high as 15 percent. This is difficult to quantify, but the situation certainly needs redress.

3.9. The statistical valuation of current performance levels, by itself, does not reflect the full seriousness of the present situation. We have observed that there is an absence of convincing institutional arrangements to evaluate efficiency of production and maintenance operations. There is need to update methodology of work, and otherwise ensure that this vast activity involving about half a million men in the production units, workshops, sheds, depots and sicklines, is optimised in all respects. In the absence of such arrangements fresh inputs would merely be palliatives of a temporary nature.

3.10. As we shall see in greater detail in the subsequent Chapters, perspective planning and futurism in management is all but non-existent in the maintenance field. In our visits, we have noticed that each workshop tends to think of itself as a self-sufficient unit irrespective of size, location and infrastructure. The response to technology improvements is far from vigorous and we have found no evidence of a technology plan to keep the maintenance and production facilities up-to-date and cost effective. Even the substantial differences in costs of repairs from unit to unit has found no reactions at most levels of administration. The system is suffering so much by shortages that maximisation of the short-term output has become the decisive consideration. Finally, the wagon and coaching sicklines, perhaps with the most obsolete of facilities, have remained almost unchanged over the past thirty years, although it is well recognised that they are unfit to play the role expected of them.

3.11. In common with systems elsewhere, there is a two-tier maintenance infrastructure with distinct functions at both levels. The main prop of the maintenance effort is POH which is performed in the base workshops, after a pre-determined time interval or use. This is supplemented by day-to-day serviceability and safety repairs in "open line" facilities such as sheds, washing lines, and sick lines. Though, in theory, the open line can, and, to some extent, does depend on preventive inspection and repairs, with pressures for higher output and lack of facilities, break-down maintenance has become a more pre-dominant mode, especially in the case of wagons.

3.12. It is important that a balance is maintained between quantum of work performed in these two separate work centres, viz. Workshops and open Line facilities. As we shall see later, this balance has been

seriously disturbed in the past two decades and has brought in distortions which not only vitiate optimisation of resources but also affect the quality of work.

#### 4.0. Manpower.

4.1. An unusual feature of the Railways' technical administration is that, in many respects, the quality of its manpower has actually deteriorated over the years at a time when basic and vocational education has witnessed significant growth in the country. Weaknesses in manpower policies, which we shall go into more comprehensively in a subsequent report on Personnel Policy, have led to increasing recruitment of unqualified hands without matching emphasis on training. This point, when raised by us, has been repeatedly confirmed by senior officers, workshop-in-charges and supervisory staff during our visits. In many ways this is perhaps the most serious problem facing the Railways, and is not limited to rolling stock alone. The debilitating effect in the technical branches is obviously more telling, and, if left unremedied, will exercise a regressive drag on the performance of the Railways, irrespective of the levels of other inputs. To add to this, a large part of this ineffective human resource base has been drawn into an Incentive Bonus Scheme which, under the best of circumstances, attempts to churn output in numerical terms at the cost of quality, and, frequently, of even physical out-turn.\*\*

4.2. In a capsule then, the basic problem of upkeep of the rolling stock today is that the workshop capacity is inadequate for the holdings, excess work has been pushed out into the sheds and sick lines which are not designed for heavy work, and the facilities in both these tiers of maintenance are in urgent need of modernisation. Modernisation is not merely a matter of physical inputs. It involves coherent thinking, integrated approach, and adoption of management systems that and scientifically evaluate and quickly respond to the needs of a situation, no matter how fast it changes.

#### 5.0. Conclusions.

5.1. Since productivity of assets rather than their numerical proliferation, is the correct approach to generation of production capacity, maintenance requires adequate attention. At present, the situation is not satisfactory on account of a short-fall in the requisite facilities and performance.

5.2. The basic thrust in maintenance should be made in the workshops which have largely obsolete equipment and are unable to keep current with the arisings of periodic overhaul. Before heavy investment is made, however, the 49 workshops of Indian Railways should be rationalised with a view to reducing their number, and specialising the activities in each unit.

5.3. Rationalisation and modernisation should also be accompanied by improvement in management systems, production control and staff training. The workshop incentive bonus scheme also needs to be given a very close look.

\* The target for failures is one per 200,000 km. year to year comparison is difficult owing to constantly changing norms and considerable differences in reporting procedure from place to place. In 81-82, the loco failures are estimated at 9,242 out of which diesel and electric account for 5,972. The BG loco failure rate is estimated at one per 106,750 km. on diesel one per 51,622 km. on electric in 1980-81. Preliminary figures for 81-82 are one per 100,000 km. on diesel and one per 75,000

km. on electric. While about 3,000 steam locomotive failures are being reported annually, the figures probably do not reflect the actual performance especially of shunting services. The Committee have already recommended accelerated phasing out of steam and do not wish to suggest capital investment to improve the position with regard to steam locomotives.

\*\*Discussed further in Chapter V.



## ANNEXURE A.1.1

## Locomotive Holdings

	31-3-51	31-3-56	31-3-61	31-3-66	31-3-71	31-3-76	31-3-80	31-3-81	31-3-82*
<b>STEAM</b>									
B.G.	5,331	5,668	6,301	6,619	5,599	5,096	4,591	4,361	4,310
M.G.	2,90	2,942	3,601	3,600	3,398	3,024	2,918	2,763	2,000
N.G.	299	416	410	394	390	376	347	345	340
Total	8,120	9,026	10,312	10,613	9,387	8,496	7,856	7,469	7,250
<b>DIESEL</b>									
B.G.	17	47	146	520	872	1,351	1,744	1,866	1,970
M.G.	...	20	127	174	264	407	434	470	475
N.G.	...	...	8	33	33	45	65	67	70
Total	17	67	181	727	1,169	1,803	2,243	2,403	2,515
<b>ELECTRIC</b>									
B.G.	68	75	127	381	582	776	954	1,016	1,066
M.G.	4	4	4	22	20	20	20	20	20
Total	72	79	131	403	602	796	974	1,036	1,086
Grand Total	8,209	9,172	10,624	11,743	11,158	11,095	11,073	10,908	10,851
Total installed Tractive Efforts in Million Kg.	89.83	105.03	129.09	156.53	159.84	170.88	183.65	180.14	N.A.

## Coach Holdings

(In Vehicle Units)

## ANNEXURE A.1.2

	31-3-51	31-3-56	31-3-61	31-3-66	31-3-71	31-3-76	31-3-80	31-3-81	31-3-82*
<b>1.0. EMUs</b>									
B.G.	388	475	750	1,259	1,520	2,043	2,389	2,433	...
M.G.	72	99	96	96	172	174	192	192	...
Total	460	574	846	1,355	1,692	2,217	2,217	2,625	2,650
<b>2.1@ CONVENTIONAL COACHES</b> (Passenger carrying)									
B.G.	6,939	7,985	10,252	11,811	13,227	15,127	16,195	16,417	...
M.G.	5,699	7,158	8,947	10,043	10,589	10,321	10,321	10,300	...
Total	12,638	15,143	19,199	21,854	23,816	25,448	26,516	26,717	N.A.
<b>2.2. OTHER COACHING VEHICLES &amp; RAILWAY SERVICE VEHICLES</b>									
B.G.	3,500	3,560	3,849	4,536	4,348	4,306	4,467	4,432	...
M.G.	1,597	2,175	2,574	3,140	3,302	3,188	3,012	2,972	...
Total	5,097	5,735	6,423	7,676	7,650	7,494	7,479	7,404	N.A.
<b>2.3. N.G.</b>	1,045	1,383	1,540	1,668	1,657	1,579	1,518	1,513	N.A.
<b>2.4. Grand Total</b>	18,780	22,288	27,162	31,198	33,123	34,521	35,513	35,644	35,700
<b>2.5. Total seating capacity in million**.</b>	0.942	1.152	1.431	1.677	1.742	1.915	2.178	2.195	N.A.

Wagon Holdings  
(In Vehicle Units)

## ANNEXURE A.1.3

	1950-51	1955-56	1960-61	1965-66	1970-71	1975-76	1979-80	1980-81	1981-82*
B.G.	157,184	161,003	215,614	268,407	282,404	300,192	311,918	309,194	303,700
M.G.	51,184	67,291	86,900	95,477	95,711	89,760	88,197	86,889	84,000
N.G.	4,915	5,435	5,688	6,135	5,875	5,298	5,068	4,913	4,850
Grand total	213,283	233,729	308,202	370,019	383,990	395,250	405,183	400,946	392,550
Total carrying capacity in million tonnes.	4.14	4.87	6.30	8.52	9.14	10.39	11.02	11.14	11.55

\* Estimated.

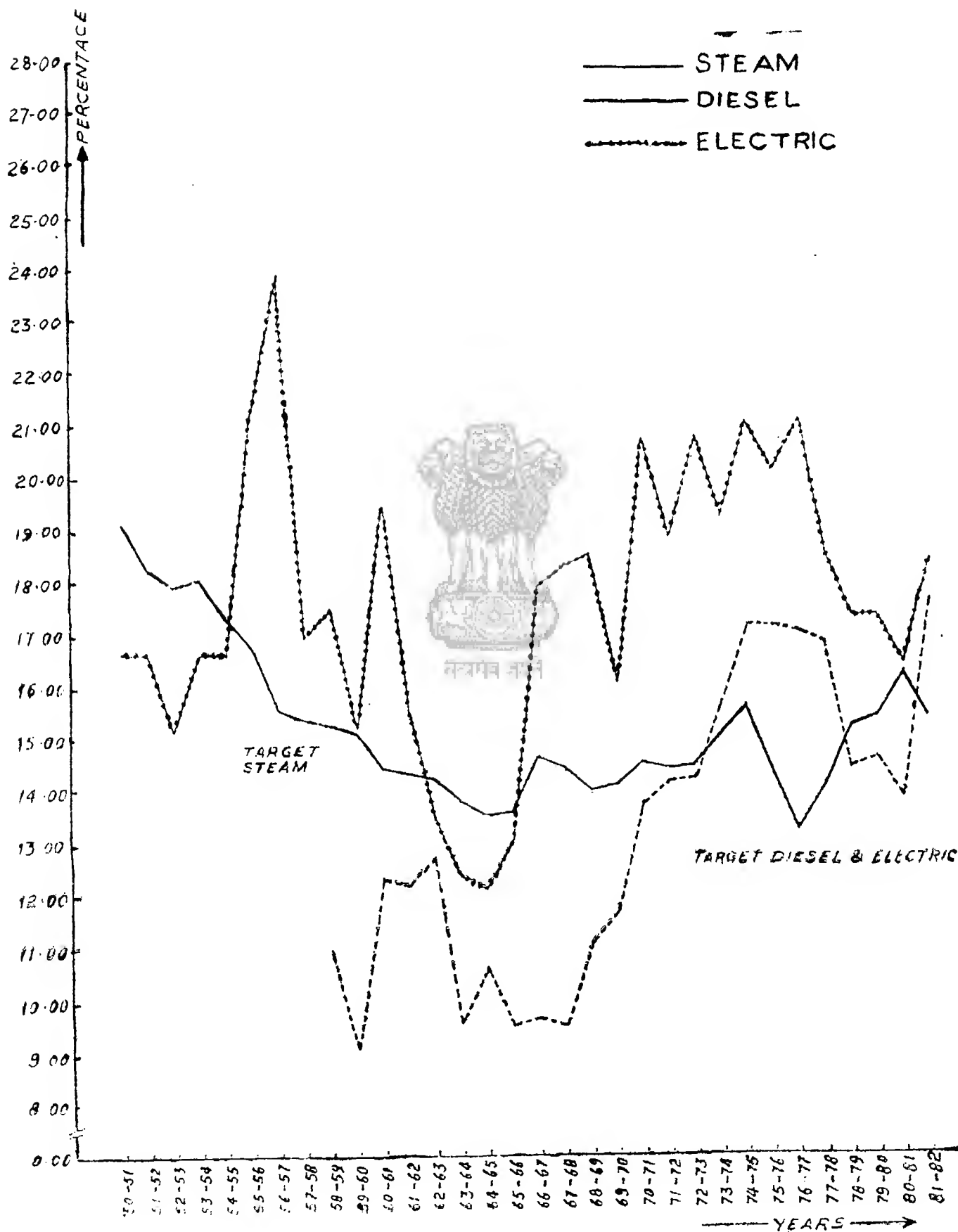
@Figures for Passenger Carrying Vehicles include Dining Cars, Military Saloons etc. Figures of other Coaching Vehicles include departmental stock. Rail Car trailers are excluded from all figures.

\*\* includes standing space in EMU's.



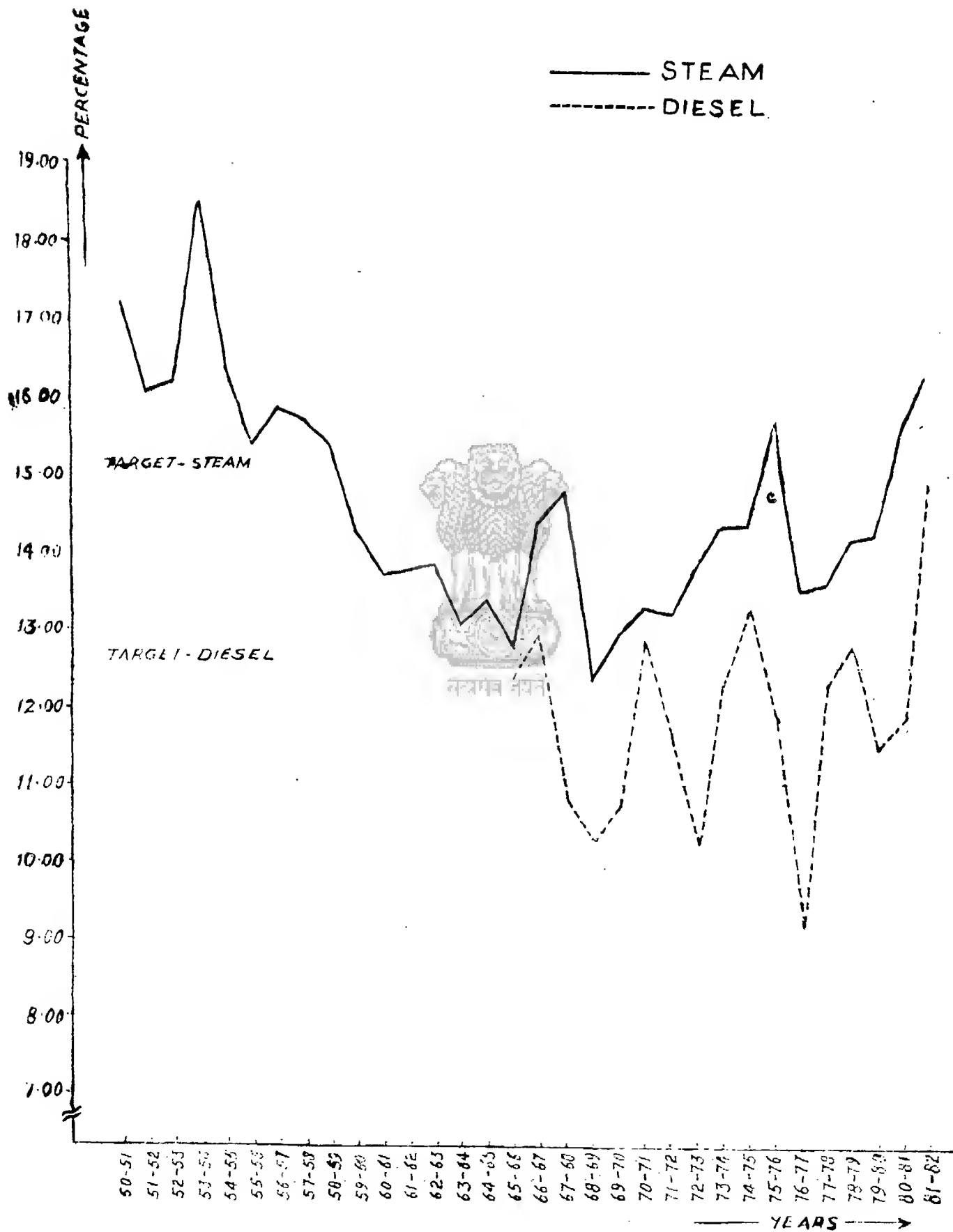
ANNEXURE — A, 1, 4,  
(Cf PARA 3.1)

### INEFFECTIVE PERCENTAGE OF LOCOS-B.Q.





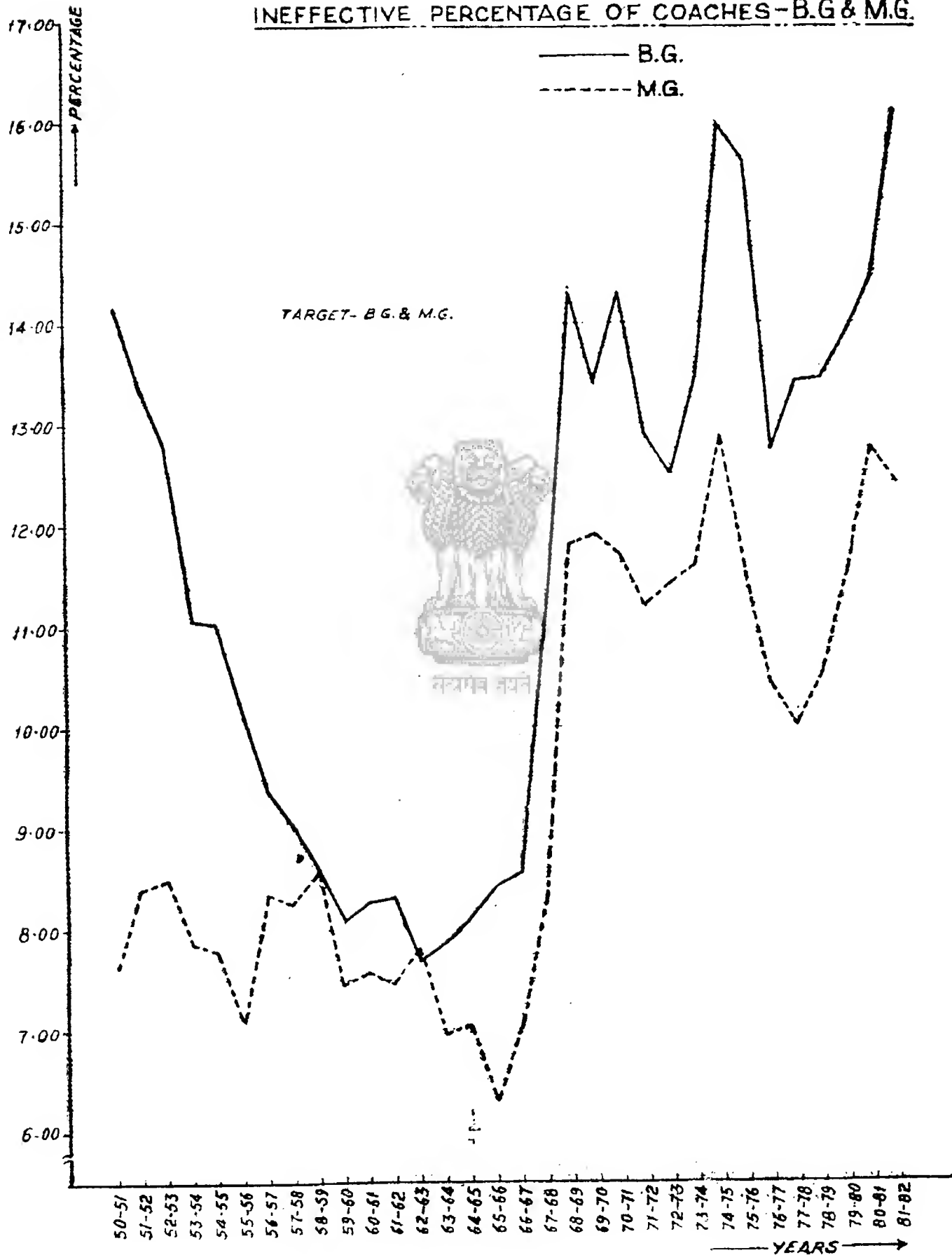
## INEFFECTIVE PERCENTAGE OF LOCOS—MG

ANNEXURE-A, 1.5.  
(Cf Para 3.)

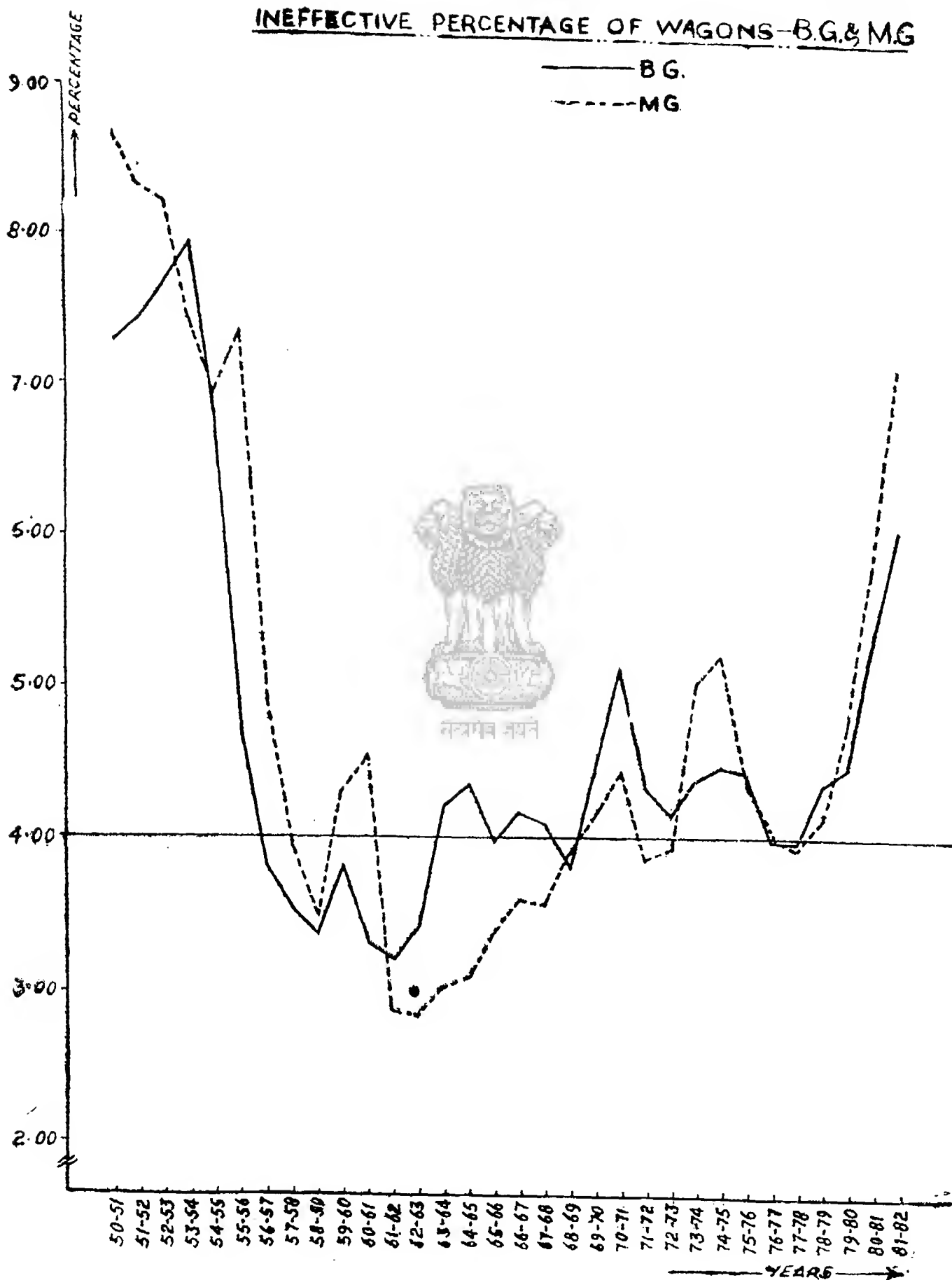


ANNEXURE - A.1.6.  
(Cf PARA 3.1, ...)

# INEFFECTIVE PERCENTAGE OF COACHES - B.G. & M.G.









## Replacements and Maintenance Arrears (BG)

	<i>End of I Plan</i>	<i>End of II Plan</i>	<i>End of III Plan</i>	<i>End of IV Plan</i>	<i>End of V Plan</i>	<i>Beginning of VI Plan</i>			
	1950-51	1955-56	1960-61	1965-66	1973-74	1977-78	1979-80	1980-81	1981-82*
<b>COACHES</b>									
Percentage overdue replacement	32.4	32.8	36.8	26.97	12.0	6.9	7.54	7.14	7.1
Mean Age in years	...	33.26	21.20	24.80	N.A.	15.15	16.00	16.22	N.A.
Percentage overdue POH	30.00	11.2	7.91	8.75	8.79	13.38	16.41	16.66	15.69
Percentage ineffective	14.17	10.19	8.26	8.42	13.45	13.41	13.9	14.46	16.13
<b>WAGONS</b>									
Percentage overdue replacement	18	18	10.29	9.63	4.15	4.45	6.49	8.42	7.40
Mean Age in years	...	25.29	17.39	16.30	N.A.	18.4	19.75	21.20	N.A.
Percentage overdue POH.	20	8.7	9.75	6.52	10.96	14.35	19.04	25.21	25.7
Percentage ineffective	7.28	4.68	3.32	3.98	4.36	3.98	4.43	5.3	6.35
<b>STEAM LOCOMOTIVES</b>									
Percentage overdue replacement	33.4	33.9	26.5	28.5	14.6	8.8	5.4	2.29	N.A.
Percentage ineffective	19.05	16.78	14.45	13.54	15.09	14.12	15.48	16.24	N.A.

\*Estimated figures of ineffective are as on 31-3-82.





## CHAPTER II

### WORKSHOPS

#### 1.0. Introduction.

1.1. Overhaul workshops have the prime responsibility for upkeep of rolling stock. They are designed to undertake the periodic overhaul of stock after its use on the system for a pre-determined period of time. Between two successive overhauls, rolling stock is to be maintained for its operational fitness in the field maintenance system, consisting of sheds, washing lines and sick lines. If, however, the workshops do not achieve requisite quality standards of work, or are unable to prevent arrears of maintenance from building up, the condition of stock is bound to deteriorate no matter how efficient the open line units are.

1.2. To put it more pointedly, field maintenance can never be a substitute for workshop maintenance. Workshops must remain the most vital factor in the scheme of maintenance on the Railways. This is of particular relevance to the upkeep of wagons and coaches. It will be seen in our analysis hereinafter, that we consider the maintenance of wagons and coaches as basically workshops-oriented. To subserve these objectives, considerable revamping of the facilities will be necessary in the Railway workshops.

#### 2.0. Rationalisation.

2.1. Before any inputs can be considered for the workshops as part of an institutional thrust, a hard look is necessary on the role of the existing establishments and the part they have to play, not only in the immediate future but also in the maintenance matrix during the next two decades and more. This exercise is essential to iron out the historical hangover of excessive multiplicity in workshops, all originally conceived to serve individual, and sometimes very tiny Company Railways, which have long since lost their identity in a national system.

2.2. In paragraph 2.1 of Chapter I, we have focussed attention on the need for rationalisation. The integrated Indian Railway network had inherited some large-scale facilities such as the old East Indian Railway Works at Jamalpur and the maintenance complex of Bengal Nagpur Railway at Kharagpur, each employing several thousands of workers; but, at the other end of the scale, it also took over a cluster of absurdly small units mostly in Western India, each employing less than 200 men and giving outturns of less than one unit a day e.g., Bhavnagar, Morvi, Gondal, Ahmedabad, Jaipur and Udaipur. Jaipur Workshops are a typical example, which, at the time of integration, were giving an output of one coaching unit every fourth day and one goods wagon every eighth day.

2.3. Thirty years after the creation of a national network, the position substantially remains unaltered.

#### 3.0. Economies of scale.

3.1. There are inherent drawbacks in running mini workshops within an organisation as large as the Indian Railways. The benefits and economies in

working on a larger scale are sufficiently well known. It is, however, relevant to point out that the transit time involved in extracting a vehicle from an operating stream, getting it ready for a feed into a workshop, despatch time to the over-hauling base, and repetition of the cycle in the reverse direction after repairs, accounts for a very high percentage of the down-time. Nearly one-fifth of the targetted ineffective time is currently permissible for shopping movements,\* but in practice the Committee learn, the time taken is much higher. The cost of movement, the effort involved, and effective loss of capacity can be considerably reduced if stock is moved in convenient blocks. Under an ideal condition, in keeping with operating concepts recommended in Part II of our Report, the system would be of a full rake in, and a full rake out. This dictates its own logic about the minimum capacity desirable in any workshop, and the distances to which rakes of wagons and coaches should go for maintenance.

3.2. Within the workshop also, economies can be significant. A comparison of costs of overhaul between workshops, in generally homogenous regions, as indicated in Table 2.1, speaks for itself.

Table 2.1

#### Cost of POH

Region	Workshop	Out-turn of coaches in 4-wheeler units in 1979-80	Unit cost of POH in 1979-80 Rs.
Eastern	1 Liluah	2,640	11,807
	2 Kanchrapara	974	17,145
South Eastern	1 Kharagpur	2,344	13,803
	2 Raipur	116	20,142
Southern	1 Perambur	3,136	14,057
	2 Lalaguda	1,408	15,772

Source : Locomotive Carriage & Wagon Workshop Repair statistics for the year 1979-80.

3.3. The reasons for variation in costs are manifold and can, no doubt, be explained in each individual case. In this context, if in each region, costs had conformed to the levels of the more cost-efficient unit, the savings in 1979-80 would have been Rs. 80 lakhs from Kanchrapara. Raipur and Lalaguda Shops alone. Extrapolating these figures to 49 workshops and other types of stock also, the scope for economy is considerable.

#### 4.0. Infrastructural advantages.

4.1. There are other important factors which point towards the need for greater homogeneity in size. It

\*Movement of stock for feeding for periodic overhaul to workshops, and their return to operational stream.



is not economical to give the requisite managerial and infrastructural support to small units. It is virtually impossible to utilise present generation modern machinery and plant with high capacity ratings in an economical manner without substantial work load. There is need for proper and suitably manned organisations for inspection, procurement, plant maintenance and co-ordination, and these supporting activities become uneconomical if the units are too small.

4.2. Finally, there is advantage in having workshops engaged in similar work on a fairly common scale because of the potential to standardise the machines, repair procedures, and production control systems. We recommend, therefore that in planning for workload, rationalisation is given first priority to ensure that investments produce maximum return.

#### 5.0. Past opportunities.

5.1. The need for such rationalisation has been recognised for many years now, and was specifically commented upon by a study team of the Administrative Reforms Commission, under the Chairmanship of Dr. H.N. Kunzru, in paragraph 7.3 of their Report submitted in 1968. This is what it says:

“Consequent on the various railways having been under different managements, they have developed their own facilities with the object of self sufficiency. The absence of any supporting industry either in the private or in the public sector capable of manufacturing and supplying spare parts had compelled the different railways to manufacture almost all their requirements in their own workshops. The result is that there are as many as 13 major and 18 minor mechanical workshops for the repair and overhaul of rolling stock. This has led to considerable multiplicity of repair arrangements, multiplicity of costly equipment and a diffused stocking of spare parts and material which inevitably builds up inventories. This has hampered the rational distribution of work. We, therefore, consider that it is high time that workshop reorganisation is taken up with sufficient fore-thought, imagination and coordinated planning to obtain optimum results.”

5.2. The emphasis in the earlier years after independence seems to have pushed this requirement into the background. The heavy backlog of maintenance brought out in paragraph 3.0, Chapter I, coupled with a very large increase in rolling stock holdings appear to have directed management energy towards augmenting capacity anywhere and everywhere possible. It is unfortunate that later, especially after the Third Five Year Plan when the pace of stock addition had slowed down,\* no change in thinking took place. Yet inexorable pressures of modernisation have been suggesting, and, indeed forcing, some movement towards rearrangement of traditional responsibilities. For example, with the introduction of diesel and electric locomotives, POH units have already been given responsibility for servicing groups of zonal Railways, in place of the individual zonal self-sufficiency approach. In the case of wagons, exigencies of operations have resulted in overhaul being undertaken by each workshop on the basis of locational availability, irrespective of the Zone

or Railway to which they belong. What has lacked, and is now required to be made good, is the adoption of an overall institutional thrust with a systems approach.

#### 6.0. The RITES plan.

6.1. The Committee note that rationalisation has been extensively dealt with in a Master Plan Study for Workshops made by RITES,† which was submitted to the Railway Board in November, 1980. RITES have formulated a conceptual plan, whose main features are :

1. Reducing the product-mix per workshop to the least which is economically feasible.
2. Concentrating EMU and coaching workshops near metropolitan cities to the extent possible, with a view to minimising movements.
3. Conversion of steam locomotive shops for other POH activities before building new workshops. (Although considerable remodelling would be required, much economy can be achieved by making use of existing infrastructural facilities.
4. Separation of manufacturing/remanufacturing overhaul and putting the unit exchange system, on a sound footing to ensure quality and reduce down-time.

6.2. We endorse this approach as sound guiding principles, and recommend that it be adopted as pre-requisite to modernisation.

#### 7.0. Quantification of rationalisation.

7.1. The proposals made by RITES involve closing down of eight small uneconomical shops, converting two existing shops for wagon manufacture, shedding of POH load from one Production Unit (CLW)\*\* and one EMU Car Shed (Kurla). On the other hand, four new workshops have been envisaged by them and the Committee note that three are, in any case, in various stages of construction. Workload is to be redistributed to reduce the product-mix per shop in the interests of efficiency. The net result of the whole exercise would reduce the total number of workshops from 45‡ to 37, and taking into account the four new units, it is estimated that the system would be able to handle the anticipated workload for the year 2000 AD.

7.2. As against the general practice at present of mixed activity at each workshop, only 10 units would have more than one activity in the future workload plan while 27 will be expected to concentrate and specialise in a single type of rolling stock. The average number of activities per workshop would reduce to an average of 1.32 as against 1.91 today. Annexure A.2.1 and A.2.2 sum up the entire position.

#### 8.0. Further possibilities.

8.1. While the RITES analysis is a step in the right direction, it is our view that it does not go far enough in view of the fact that the RITES' terms of reference appear to have been limited by some conservative features that we do not consider valid in a bold plan.

\* During the first three Plan periods the increase in stock holdings was 194.5% on EMUs, 66% on coaches, and 73.4% on wagons. This fell off to 93.7%, 14.2% and 8.3% respectively in the next fifteen years.

† Rail India Technical and Economic Service, a public sector consultancy unit under the Ministry of Railways.

\*\* Chittaranjan Locomotive Works.

‡ This refers to BG and MG shops only.



8.2. RITES have assumed certain stock holdings for the year 2000 AD and these forecasts are fundamental to their plan. Annexure A.2.3 sets out these anticipations in some detail. A few points are noteworthy. Firstly, 2,209 BG and MG steam locomotives have been projected as remaining in service. We must caution against future planning based on continuance of steam locomotives for such a period. We have already recommended in Part II of our Report on Transportation,\* that steam locomotives be phased out in accordance with a workable production plan, and, according to our estimates, they can be completely removed from the traction scene by end March, 1996. Under the circumstances, there would be no necessity to continue MG steam locomotive overhaul at Gorakhpur and Hubli as envisaged by RITES and the Donad workshop earmarked in RITES' plan for BG steam locomotive POH would also become totally redundant.† This, by itself, would reduce the number of Workshops to 36 and the total number of activities to 47 as against 37 and 50 respectively in the RITES' projections.

8.3. More importantly, the requirements of wagon POH leave much room for doubt. Not only may wagon requirements on the BG be much lower\*\* units for levels of traffic projected by us, but it is also becoming increasingly irrelevant to talk of wagon POH in terms of four-wheeler units alone: the number of man-hours required to overhaul a typical bogie wagon (BOX type) is actually less than a four-wheeler, age for age, owing to its superior design.‡

8.4. We also cannot endorse certain suggestions made by RITES for alternative use of redundant workshops. For example Amritsar shops have been suggested for wagon production. This is quite unnecessary in view of the already existing capacity in the non-railway sector. At best it may be used for manufacture of prototypes. Railway Board should also evaluate the requirement of maintenance for other types such as cranes, track maintenance machines, bridge works etc. Some of the smaller units rendered surplus may be utilised for entirely different purposes such as training schools. There will also be need for a larger number of regional base repair depots for electronic equipment with increased application in nearly every field.

#### 9.0. Criteria for size.

9.1. RITES have conceived of a typical workshop capacity as handling 10 locomotives or 400 units of coaching stock or 2,000 four-wheeler units of wagons per month.§ In case, the bulk of the wagons are of the BOX genre, this would imply just 32 to 35 wagons per day as against a standard rake composition of 40 BOXs/55 BOXNs. The optimum capacity in each workshop is obviously higher on this consideration. The Committee would recommend that the principle of rationalisation be directed towards reducing the number of work centres, bearing in mind management capability in relation to the unit size. The rider is an important one given the history of labour productivity in the Railways. A glance at the workshop out-turn history given later in Table 2.4 would indicate the sharp drop of out-turn during periods of poor national disciplinary climate. The Ministry of Railways will, therefore, have to take an overall view, having regard

not only to the two opposing criteria mentioned above, but also the vastly improved production control and management information systems that have necessarily to be incorporated in workshops, along with a proper choice of technology.

#### 10.0. Other aspects.

10.1. There is more to rationalisation than merely standardising of workshop capacities and limiting their numbers. The facilities in the workshops have to be examined with a view to providing inputs based on future projections of types of stock, suitable technologies and material handling developments. Nowhere is this more apparent than in the change in qualitative and quantitative requirements of machinery and plant with replacement of steam by diesel and electric traction. Steam locomotives depended primarily on workshop manufacture of parts and components for their maintenance. The diesel and electric locomotives, on the other hand, largely depend on purchases from trade. So far make/buy decisions have been largely based on existing capacities, no matter how inefficient the procurement decision may turn out to be. In our visits to the workshops, we have not been satisfied that a proper scrutiny has been made of the possibility of large sections of the workshops becoming permanently redundant and the equipment being scrapped or otherwise disposed of without replacements.

#### 11.0. Redundant facilities.

11.1. This is particularly true of the 'hot' shops in general, and heavier forging sections in particular. With the possible exception of the Chittaranjan Steel Foundry, the smithies, forge shops and cast iron foundries of the railway workshops are amongst the most obsolete industrial units anywhere. Not only are proper handling system totally absent, but we have been surprised also at the extent of environmental pollution and the unhealthy conditions of work.

11.2. We were informed that a significant percentage of workers in these units have become hard of hearing. We noticed particularly in the Liluah Workshop of the Eastern Railway that atmospheric conditions inside the smithy and spring shops were hardly better than what may be expected in a coal mine.

#### 12.0. Curtailing investment.

12.1. We have no doubt that if the Railways continue to preserve the units which are redundant, they would sooner or later be forced to make large scale investments in anti-pollution measures, which may be avoidable in the context of the Railways' requirements.

12.2. This is another strong reason to dispense with steam traction as early as possible and eliminate the necessity of sustaining many undesirable white elephants in the system.

#### 13.0. Make/buy decisions.

13.1. We shall be making recommendations regarding materials management in a subsequent Report.

\* See Chapter VII under Traction Policy.

† See Annexure (A-2.2.)

\*\* Compare the figures projected by us in Table 4.2, with the figures used by RITES in Annexure A-2.3.

‡ According to figures made available to us, the POH of a four-wheeler wagon in the 10-20 years age group is taking about

400-500 man-hours while a BOX wagon in the same age group requires 250-275 on body and under frame. Even the additional amount on bogie repairs will not raise the total requirements beyond the four-wheeler effort.

§ RITES initial plan made projections only upto 1989-90 and the capacities per workshop were lower than those shown here. The figures mentioned are a further development made by the Planning Directorate of the Railway Board for 2000 A.D.



Make/buy decisions would have important ramifications on stores procurement, distribution and inventory. While such decisions are a continuing process, they have to be subjected to some limiting parameters on the kinds of production facilities that should be made available in-house.

13.2. We have, therefore, to stress that all these aspects of rationalisation be comprehensively dealt with and a clear policy adopted before launching into expensive revamping schemes, which are likely to cost several hundred crores of rupees over the next decade or so.

#### 14.0. Implementation

14.1. Though the ground breaking study made by RITES was submitted to the Ministry of Railways more than two years ago, we have not been able to see any evidence of any concrete decisions having been taken. During our visits to the workshops, we invariably found that none of the officers in the workshops had any clear idea about the thinking on the future role of the units. They continue to plan for machinery, plant and works, entirely based on current needs. Under these circumstances, it is futile to expect grass roots planning which we advocate. In one particular unit, the major part of our visit to the shop floor was devoted to an explanation by the workshops in-charge of how he planned to increase the POH out-turn of diesel locomotives. Yet, according to the RITES' plan, this workshop would be totally off-loaded from diesel POH within a time frame of five years. We are concerned about this lack of communication and total absence of a perspective plan.

14.2. We recommend that the Railway Board should immediately apply themselves to the preparation of a properly integrated rationalisation scheme, even if marginal changes have to be made later. Absence of such a rationalisation scheme, the Committee have noted during their visits to different workshops, has resulted in considerable adhocism and dis-jointed management decisions.\* This rationalisation scheme must clearly lay down a stage-wise implementation so as to enable the workshop authorities to keep viable layouts, plant and equipment, and, manpower training plans are taken up well in advance. Some hard decisions have necessarily to be made since reduction in the number of units cannot but involve transfer of staff, disturbance to set patterns and special re-training for many personnel. Some of the small units can obviously be closed down immediately without any real effect on the system's capacity. Soft pedalling the problem, or otherwise postponing decision making, however, will only add to the difficulties and result in making large scale investments partially infructuous for a time or vitiate their full utilisation.

#### 15.0. Renaissance : Modernisation of methods.

15.1. It is fundamental to our approach to maintenance that the quality of out-turn from the overhaul workshops should provide high levels of reliability and confidence. We have enunciated this unexceptionable principle in paragraphs 3.11 and 3.12 of Chapter I and we cannot over-emphasise that the performance of the workshops lies at the root of productivity potential of

the Railways. After visits to various Shops and discussions with officials, we consider that, as of today, the workshops are not geared to this role. The officers-in-charge of the workshops themselves are the first to concede this. There is, however, a certain pride in those who manage these Shops and, at any rate, at most places they are doing their best under many restraints. With prevailing enthusiasm of this kind, the situation is not without hope, and in fact, augers well for the future.

15.2. Over the past 30 years, the capacities and capabilities of workshops have been gradually modified to meet changing load requirements.† These changes have been undertaken piecemeal largely due to inadequacy of funds. Lack of a total industrial engineering approach, has resulted in a number of system lacunae. Patch work planning has affected the flow of work and material, and production control systems have deteriorated. Material bottlenecks continue to be a recurring phenomenon and have become increasingly critical with the sophistication in designs. The lack of integration between maintenance and material's management is obvious at all levels of the organisation. This unscientific planning has also resulted in production capacity imbalances that have prevented sustaining of the 'unit exchange system' which occupies so central a position in modern maintenance philosophy. Finally,‡ at the level of physical assets, more than 75 per cent of the machinery and plant in the workshops is reported to have outlived its economic cycle life.\*\* Even in the Production Units, the figure is more than 50 per cent.

15.3. The Railways must be unique in having allowed themselves to get more run down, after three decades of planning, than in a denuded environment at the end of the Second World War. Even though during the Sixth Plan, the Railways have shown greater awareness of the need to keep their capital assets in a good state, the Planning Commission was approached for Rs. 354 crores, less than half the Rs. 740 crores † which was estimated as required for updating the overaged machinery and plant. The Planning Commission released only Rs. 230 crores. @ inclusive of expansion requirements.

#### 16.0. Chittaranjan and Kanchrapara : a case study.

16.1. The situation is best illustrated by the position at the Chittaranjan Locomotive Works, an important production unit manufacturing electric locomotives and diesel shunters. Even though the product line of diesels commenced only fifteen years ago, and for electric locomotives the current design is hardly eleven years old, 70 per cent of the machinery and plant is overaged, as found during the Committee's visit and from discussions at Chittaranjan in August 1982. It is necessary to appreciate the reason behind this phenomenon. The diesel and electric locomotive production at Chittaranjan was initiated largely utilising the earlier steam locomotive manufacturing equipment. There is, therefore, little wonder that such machinery by now should have outlived its utility.

16.2. The Kanchrapara Workshop of the Eastern Railway which overhauls both electric locomotives and EMUs, and undertakes specialised activities such as rewinding of traction motors and transformers, has about 1,000 machines, the bulk of which are more than 30 years old. Some of them have been in continuous service for the past sixty years.

\* The need for having an overall layout plan and application of modern technological principles in the same has been discussed in depth later in this Chapter.

† Capacities have, however, fallen short of requirement as we will discuss later in this Chapter.

\*\* 15 years for single/double shift machines and 9 years for triple shifts.

‡ See Annexure A-1.9, 51 of part IV of our Report.

@ See also paragraph 3.4, Chapter I of Part I of our Report.



16.3. At a time when the Railways are on the threshold of doubling their traffic within a few years, technology levels in the workshops are thus totally inadequate to meet the challenge. In this environment, it is unrealistic to expect greater quality of output or reduce repair time.

#### 17.0. Modernisation Project and COFMOW.

17.1. Modernisation of the workshops was first identified in the Corporate Plan framed in 1976 and forms a major component of the Indian Railways' Modernisation and Maintenance Project being financed by a World Bank credit of US \$ 190 million.\* Out of this loan US \$ 128 million (Rs. 110 crores) is towards workshop modernisation, the first phase of which is now fairly well advanced. In this phase, four overhaul workshops and one production unit have been identified viz. Kanchrapara (ER), Matunga (CR), Kharagpur (SER), Parl (WR) and Chittaranjan Locomotive Works (Chittaranjan).

17.2. To progress the machinery and plant procurement for this purpose, the Railway Board has set up a "Central Organisation for Modernisation of Workshops" (COFMOW), headquartered in New Delhi. COFMOW has been entrusted with procurement of machines which fall into the so-called, standard groups, i.e., machine types common to the various Zonal Railways. It started functioning in April 1979, and at the start of 1982-83, had placed orders for about 75 per cent of the 927 machines involved at an estimated cost of Rs. 78.7 crores.

#### 18.0. The Role of COFMOW.

18.1. Creation of COFMOW is, no doubt, a major step forward but is simply not enough. The traditional planning process for machinery and plant procurement entails proposals being initiated from the individual workshops and other establishments, and not infrequently, the exact starting point is at fairly low levels in the organisation. The workshop and shed managements are primarily out-turn oriented, and no proper planning cells are in existence. There is virtually no exposure to contemporary developments in the field of machine tool technology, production systems etc., at any levels of the organisation. The perspective at these field levels is very limited in the absence of a well defined, long-term plan that clearly lays down future responsibilities and product mix.

18.2. COFMOW has filled some part of the gap by evolving a data bank, updating machine specifications and providing a specialised procurement service. This has resulted in annual machinery and plant procurement rising to about Rs. 40 crores as against the earlier figure of Rs. 8-9 crores. This would certainly not have been possible with the traditional decentralised purchases by the individual zonal railways and production units. There are, however, many other aspects of modernisation for which no structural arrangements have been made and there is a risk of imbalanced and unoptimised investments.

#### 19.0. The uncovered gap.

19.1. Modernisation involves the following major thrusts :

1. Improvements in layouts and introduction of efficient material handling equipment.

2. Introduction of the latest technology for the manufacturing of components, assembly and testing.
3. Methods improvement and review of time standards by continuous work study.
4. Introduction of computerised management information system with specific attention to production planning and control.
5. Application of operations research models to set up production programmes, job sequencing, capacity planning, inventory control and inspection procedures.
6. Setting up and sustaining of a unit exchange systems as an integral part of maintenance to reduce down time.

19.2. Mere introduction of COFMOW as a procurement agency with a regulatory role for specifications is quite inadequate to meet the task. The basic planning procedure has also to be updated. Arrangements will have to be made within the Railway organisation for :

1. Involvement of specialised agencies in modernisation plans at the grass roots level.
2. Development of a specific technology plan for major aspects of overhaul and manufacturing work.
3. Facilities to evolve and test the most cost-effective repair procedures and evolve standard timings and methodology.
4. A centralised thrust at identifying hardware and software for introduction of computerised management information system.
5. Training at all levels to meet both technical and systems requirements that modernisation would necessarily require.

#### 20.0. A strategy for modernisation.

20.1. Modernisation is not an adhoc process. To obtain maximum benefits out of a modernisation programme, the same has to be based on a systems approach of the entire workshop, or even a chain of workshops with application of the modern techniques of layout and project planning, inclusive of service facilities and ergonomics. On the Indian Railway system we have not come across such a systems approach towards modernisation, and the first tentative step forward started in a way with the COFMOW project.

20.2. The starting point has to be the planning process. This cannot be left to individual workshop officers who are already hard pressed with officer to man ratios running in excess of 1:500† and who are bogged down in day-to-day matters, arising out of shortages, and inadequate facilities. The bulk of these workshop officers, have risen to these levels from supervisory grades and have not been adequately trained for fulfilling higher responsibilities. They are not suitable for major one-time planning. Even the graduate engineers have been brought up in an environment of inefficient and obsolete technologies and do not have sufficient exposure to contemporary developments. The task, therefore, has to be taken up by specialised

\* World Bank Loan No. 844-IN.

† See Chapter V



bodies who can take up the job for a limited period on a whole time basis. It appears that RITES who have done work in evolving the conceptual plans or rationalisation and modernisation, could be entrusted with the task, and they may be aided by COFMOW with regard to machinery and plant data. Contrary to some opinions expressed to us, we do not consider the RDSO, as the right body to initiate or steer modernisation plans.

20.3. There is no point in the Indian Railways trying to build up a separate organisation, for systems modernisation of workshops. In our opinion, for the long-term, COFMOW can be developed into a quasi-permanent organisation for conceiving and executing workshop modernisation programmes. For this purpose, in the first instance COFMOW should be assigned the all important responsibility of developing a 'technology plan', the absence of which is glaringly apparent.

20.4. There should be a continual technology updating for modernisation carried out by COFMOW, while RITES may be given consultancy assignments for ergonomics and layout designing in respect of specific workshops. There should be constant interface between COFMOW and RITES.

20.5. RITES and COFMOW will need support from within the Railways for data access and experimental studies. It would, therefore, be necessary to provide the officer in-charge of workshop and maintenance unit planning, suitable assistance specifically for modernisation projects. These engineers should be physically located in the various workshops for suitable periods. We have observed that the officer in-charge of planning and projects in the mechanical wing of the Zonal Railway headquarters is largely unassisted and his function is mostly limited to progress chasing, liaison and budgetary aspects.

20.6. The modernisation programme, later to be extended to all workshops and production units of Railways, is of such gigantic dimensions, that we apprehend that at present neither RITES nor COFMOW will be able to provide the full range of expertise internally. RITES should, therefore, be asked to freely avail themselves of advice from outside the railway sector.

20.7. In specialised areas such as industrial architecture, integrated production control, flexible layout systems etc. RITES and COFMOW should build up their presence both nationally and abroad as the clearing house for technology and maintain their contacts through the latest technical literature, symposia, lectures, demonstration etc.

## 21.0. The pursuit of optimisation.

21.1. The techniques and methodology of repairs are not available off the shelf from any one source. In any case, a large portion of the activity in overhaul of locomotives, coaches, wagons etc. is peculiar to the Railways. We have already brought out in Table 3.1 the wide differences in unit cost of POH. We have also noticed widely differing repair practices. An analysis made of the data compiled by RITES, as part of their Master Plan Study for workshops, brings out that per equated BG\* wagon overhauled, the consumption of electricity varies from 0.2 KWH to 0.75

KWH, industrial gases between 8.5 cubic metres and 30 cubic metres, and grease between 0.9 and 3.0 kg. This lack of standardisation assumes importance in the background of a total consumption in excess of 140 million KWH of electricity and 2.7 million cubic metres of industrial gases per annum in all the workshops put together.†

21.2. Manufacturers' manuals, historical experience and individual initiative, while all have their uses, are individually and collectively not sufficient to provide for continuity of the optimisation exercise so necessary, as these do not cover the whole gamut and sequencing of operations. The matter assumes added importance because of the system of Payment by Results, which has been adopted in the workshops based on time standard.‡ There does not appear to be a system of studying a subject or a problem in depth to develop the strategy for optimising the methodology and therefore it is obviously necessary to replace the adhoc approach by systematic study.

21.3. As far back as 1973, the National Council for Science and Technology had recommended the creation of a Central Manufacture, Repair and Maintenance Technology Institute for the Railways, which was later accepted in the Railways Corporate Plan of 1976. No action has yet been taken to implement this. The importance of maintenance technology to the country as a whole, can be illustrated by the fact that in 1976-77 the Railways' maintenance facilities accounted for almost 15 per cent of the nation's labour force in the organised engineering sector. In the Committee's view this Institute would pay for itself by the introduction of better and more effective maintenance. Through increased efficiency significant economies can be achieved. The Institute should, therefore, be set up on a high priority.

21.4. The Institute should also serve as the nucleus for training on advanced technologies and equipment. It is difficult for us to have a clear assessment of what it would cost, but one estimate prepared by the RDSO has placed the capital cost at about Rs. 4 crores out of which the technology research portion may not exceed about Rs. 80 lakhs. About Rs. 160 lakhs of this cost would be required for training facilities which are in any case necessary.@

Much of the equipment would be common for both functions. The balance amount would be necessary for common facilities such as offices, library, staff housing etc. The annual recurring cost as per the above estimate would be about Rs. 40 to 50 lakhs. The benefits that should accrue when such an institute becomes operative need not be measured in terms of specific financial returns. The benefits, in fact, will be much more extensive than what may be revealed by a simple IRR. This institute should provide the nucleus for bringing about and experimenting with new ideas about maintenance methodology and practices, which, in turn, would stimulate all round betterment in performance. In this context, it may be relevant to indicate that in 1981, as many as 350 cases of railway accidents have been caused by failure of rolling stock.

\* This is an output index used in the Railways to bring overhaul-output of all types of stock on to a common base.

† These are rough estimates. The total consumption of grease could not be ascertained with reasonable accuracy.

‡ See Chapter V for a more detailed discussion on the Incentive Scheme.

@ The question is of providing such facilities alongwith the proposed institute or elsewhere, and to have them in the same location appears advantageous because of the facilities the institute would have, in any case.



## 22.0. Unit exchange system.

22.1. Although the Unit exchange system has been, for many years, a part of the praxis of maintenance thinking on the Railways, it physically does not exist, and even where it has been adopted in the past, it could not be maintained effectively for any length of time. This is, perhaps, on account of shortage of spares and their timely availability. It is also possible that management commitment to this useful system has been lacking. RITES have argued forcefully in their Workshop Master Plan Study in favour of such a system. They have worked out a standard scale of unit exchange assemblies and by network analysis estimated reduction in overhaul down time as indicated in Table 2.2. The figures given in Table 2.2 compare theoretical repair periods with the existing technology. The actual time taken for overhaul on the BG and MG systems in the recent past have been considerably more as indicated in Table 2.3.

Table 2.2+

POH time with and without MRUE system			
Sl. No.	Type of locomotive/ Type of rolling stock	POH time without MRUE* system (in days)	POH time after introduction of MRUE (in days)
1.	Diesel/electric Locomotive.	23	12
2.	Electric locomotive	24	17
3.	Coach	20	16
4.	EMU Motor coach	25	18

Table 2.3

Repair time for POH			
Type of rolling stock		No. of calendar days	
		1979-80	1980-81
<b>B.G. :</b>			
1.	Diesel electric locomotive.	34.5	37.1
2.	Electric locomotive	89.6	75.9
3.	Wagon@	11.4	10.6
4.	Coach	27.7	26.3
<b>M.G. :</b>			
1.	Diesel locomotive	30.9	29.2
2.	Wagon	11.8	10.6
3.	Coach	19.5	22.2

N.B.—Source.—Locomotive, Carriage and Wagon Workshop repair statistics.

22.2. The total effect of rationalisation and modernisation should be not only to actually turn out stock within the present theoretical throughput period, decrease the period by introduction of unit exchange, but also considerably reduce even the theoretical through-

put time with unit exchange system when newer technologies are adopted. For example, in the table given above the BG Coach POH paint schedule both with and without MRUE systems was assumed by RITES as six days. This can be brought down to as low as three days with proper choice of technology, e.g. use of quick-drying paints, better application methods etc. The benefits of reducing down time to about 40 percent of 1979-80 figures are highlighted by the fact that if the POH period of a coach can be reduced to 13 days from the present 27.0 days, total requirement of coaches gets reduced by almost four percent. In absolute terms, this may mean a reduction in the aggregate requirement by about 2,100 at the turn of the century, with a saving of Rs. 170 crores at current prices. This would also reduce the POH arisings by 2,100 coaches per year. Similar would be the position for locomotives and wagons. Besides, as a result of POH time getting reduced, the POH capacity of the workshops will get enhanced and hence there would be a reduction in the need for creation of additional workshop capacity on this account.

22.3. We recommend, therefore, that a modular approach to repairs be organised by a suitable one-time investment in spare assemblies such as bogies, wheelsets, motors, complete engines, compressors, exhausters etc. In the locomotive sheds and coaching sicklines, which we would take up in the next Chapter, there should be one or more sets of spare equipment ready to use at all times.

## 23.0. Reorganisation of production controls.

23.1. We consider that it is no longer possible to postpone the use of computerised control systems in the major workshops. We have gone into this subject in some detail and would be covering it more fully in a subsequent Report on Management Information Systems for the Railways.

23.2. We have found in the major workshops we have visited, that thousands of work orders are being complied with every month, partially or fully; some for use within the workshops themselves and some to supply spares to the Divisions. Material with-drawals and Incentive Bonus payments to staff (running into thousands of workers either on individual or group basis) have to be correlated with work order compliance, along with pre and post inspection, idle times, machine, setting up, plant maintenance etc

23.3. The present method of employing a large number of personnel in manual production control and progress chasing organisations is inefficient and totally unequal to the task. We have noted that there is an on-going project for a real-time on line control in the production units, but there has been no thinking so far, for the maintenance workshops. The nature of work in the workshops is closer to jobbing and, therefore, the requirements can be quite as demanding. Some of the Units have already indented mini-computers which may be delivered shortly. This is too complex a subject for the workshops to enter into within their own management resources, especially in the total absence of training. We recommend that a special task force be set up to chalk out the requirements of one workshop and develop the system over a period of two to three years before extending the coverage to other units.

† RITES did not spell out the unit exchange possibilities for wagons.

\* MRUE is the term used by RITES as an acronym for "Manufacturing/Remanufacturing Unit Exchange." It is fundamental

to unit exchange systems that, in the maintenance sections, the defective part is merely replaced by one which has either been newly manufactured, or renewed by replacement of certain parts, in a separate place in the workshop/maintenance unit.  
@ Target is 4 days.



23.4. We do not consider it necessary for the workshops to instal on-line systems until adequate experience is gained from the Production Units. This cannot be adopted all at once, as staff are not trained and real-time computerisation for this purpose expensive. A pilot project, however, should be launched early for functional applications.

#### 24.0. Industrial engineering and operations research.

24.1. Major workshops have been provided with a Production Engineer whose job is largely devoted to routine evaluation of head-loads by sections and groups of machines, and incentive earnings. He also generally serves as an assistant to the Workshop-in-charge on a wide variety of matters, especially machinery and plant. There is no element, however, of productivity research or systems studies.

24.2. In keeping with practices in all modern organisations, we consider it essential that industrial engineering cells are set up in each workshop to ensure cost-effectiveness, quality consciousness and continuous updating of technology and methods. The application of operations research models and setting up of production programmes will, no doubt, be facilitated by the installation of in-house mini-computer systems referred to in paragraph 23.3, for the simpler applications. For the more complex and multifaced problems, the industrial engineers should interface with the proposed Central Institute for Manufacture, Repair and Maintenance Technology, which would have specialists on this subject, and also its own dedicated electronic data processing facilities.

24.3. Many of the shortcomings discussed in the previous paragraphs are a direct result of the lack of a systematic approach to problem solving. Industrial engineering would be appropriately applicable in almost all forms of activity, whether it be operations, commercial systems, personnel management etc. The sheer size and inter dependence of functions on the Railways makes it dangerous to come, to what appear to be, obvious conclusions in matters of multiple choices. The Railways, should, therefore, earmark senior, specially trained engineers in industrial engineering and ensure that they do not get bogged down in day-to-day out-turn or administration.

#### 25.0. Adequacy of facilities.

25.1. In Chapter I, we have mentioned the effect of shortfalls in POH workshop capacity on rolling stock productivity as reflected by the ineffective percentages. The gap between requirement and capacity which started becoming significant from the mid Sixties has now reached serious proportions, as brought out in Table 2.4 Page especially because of its cumulative effect.

25.2. In spite of the range of capacity estimation, the shortfalls are striking, especially on the B.G. Table 2.5 Page shows the leeway to be made up.

Table 2.4

#### Capacities and POH arisings

Type of stock	Monthly capacity of workshops as estimated by the Railway Board in 1981-82*	Monthly capacity as estimated by RITES in 1979*	Average actual output per month					Monthly arisings in 1981-82
			75-76	77-78	79-80	80-81	81-82	
BG Coaches	2,060	2,202	1,787	1,710	1,896	1,924	1,952	2,540
BG Wagons	8,280	7,905	7,970	7,536	5,461	5,957	7,455	9,350
MG Coaches	1,389	1,513	1,378	1,419	1,276	1,310	1,325	1,634
MG Wagons	2,572	2,889	2,614	2,439	2,068	2,152	2,319	2,780

Table 2.5

#### Shortfall in workshop capacity

Type of stock	Percentage utilisation of capacity in 1981-82 as per lower estimate of capacity	Percentage utilisation of capacity in 1981-82 as per higher estimate of capacity	Percentage shortfall of capacity vis-a-vis arisings as per lower estimate of capacity	Percentage shortfall of capacity as per higher estimate of capacity
BG Coaches	94.77	88.66	18.80	13.30
BG Wagons	94.31	90.04	15.40	11.44
MG Coaches	95.45	87.59	15.02	7.40
MG Wagons	90.15	80.26	7.48	Nil

25.3. In 1981-82, utilisation of workshop capacity achieved for POH of rolling stock has been around 90 per cent. While this has been a good performance by any reckoning, and the Indian Railways may, on implementation of strategies recommended by us, be able to do even better, the question that arises is about deciding the basis for planning. In this context it cannot be ignored that the index of performance in previous years has not been optimal. One has also to reckon with the various factors that dislocate performance for reasons, both indigenous to the railways as well as external. Taking all these factors into account, the Committee feel that the basis for planning, as distinct from the level of performance to be achieved in any specific year, should be 80 per cent. On the basis of 80 per cent utilisation, the shortfall in capacity varies between 30 and 35 per cent on the BG as per the latest estimates of capacity made by the Railway Board. The BG system accounts for about 80 per cent of the traffic being handled by the Railways and obviously cannot be sustained by a fleet that must necessarily continue to deteriorate in the absence of adequate maintenance infrastructure. The gap between arisings and workshop capacity has to be made good on the highest priority. We have noted the constraint of funds and Part I of our Report was specifically oriented towards urgent action in this respect. Improving availability must be preferred to financing additional assets. It is cheaper, and would strengthen rolling stock quicker.

\*The difference between the figures given by RITES and those stated by the Railway Board are, to some extent, on account of the additional man hours necessary for corrosion repairs having been taken into account by the Railway Board. Capacity of repair work is not easy to define by simple formulae.

There are, therefore, variations in the figure on account of difference in approach also. Finally there is a difference in the year of assessment. Both sets of figures have been reproduced to establish the order of the problem rather than to highlight the difference.



25.4. Railways would do well to create additional POH capacity as soon as possible and in advance of materialisation of additional demand in the Sixth and Seventh Five Year Plans and liquidate the existing backlog on a high priority.\*

25.5. Capacity shortfalls are not limited to the workshops only. They are equally marked in the open line facilities. The diesel and electric locomotives sheds are at present holding about 20 per cent more units than they have been designed for and tend to fall into arrears, especially for the heavy schedules.† Not only does this have a serious effect on reliability, but is proving to be highly expensive. In terms of input costs.‡ On the coaching and wagon fleet also, there is a serious difference between the prescribed and actual facilities as brought out in Table 2.6.

Table 2.6

**Shortfall in sick line capacity**

	<i>Approximate sick line holding capacity according to the prescribed percentage</i>	<i>Actual availability</i>
B.G. Coaches	1,604	663
B.G. Wagons	10,675	8,334

Source : Railway Board.

**26.0. Investment levels.**

26.1. It is useful to survey the expenditure on maintenance facilities over the past thirty years in comparison with the additional rolling stock acquired.

Table 2.7

**Expenditure on maintenance facilities**

<i>Period</i>	<i>Expenditure on addl. rolling stock (in crores of rupees)</i>	<i>Expenditure on Work-shops Sheds maintenance etc. (in crores of rupees)</i>	<i>Percentage expenditure on facilities vis-a-vis addl. Rail-way stock</i>
First Plan	85.0	8.0	9.4
Second Plan	251.0	16.0	6.3
Third Plan	440.0	18.0	4.1
Inter Plan Period (1966-67 to 1968-69—3 years).	202.0	11.0	5.0
Fourth Plan	362.0	18.0	5.0
Fifth Plan (1974-75 to 1977-78—4 years).	572.0	34.0	6.4
Truncated Sixth Plan (1978-79 to 1979-80).	370.0	30.0	8.0
<b>Total</b>	<b>4,202.0</b>	<b>133.0</b>	<b>3.2</b>

\* See Annexure A-1.8

† The Committee have doubts as to whether in the location of diesel and electric locomotive sheds and the optimum economies of scales vis-a-vis the size of the sheds, the number of locomotives that can be served have been kept in view. Our comment here, however, is in relation to aggregate of capacities created.

26.2. A recent estimate made by the Planning Directorate of the Railway Board has put the need-based expenditure on maintenance facilities at 16 per cent as per details given in Table 2.8.

Table 2.8

**Estimated need-based expenditure on maintenance facilities.**

<i>Type of stock</i>	<i>Need-based maintenance facility as a percentage of capital cost of stock</i>
1. Diesel and electric locomotives	.. 14.0
2. Wagons	.. 12.5
3. Coaches and trailer EMUs	.. 20.0
4. EMU Motor coaches	.. 25.0
5. Weighted average	.. 16.0

26.3. We obviously cannot independently suggest an inflexible figure to serve as a yardstick. During a discussion with us in August 1981, when the Committee met the full Board, the Member (Mechanical), Railway Board, had suggested adoption of 14 per cent as a tentative guideline. It is also possible that the figure may vary depending upon the scale of facilities and the choices of technology in future. Nonetheless, the gap between the percentage-based estimates of the Railway Board, and actuals is so wide, that it would be desirable for the Railways to adopt a minimum percentage relationship as a rough check in dealing with phasing of funding and projection of requirements.

26.4. It would be useful to make a conceptual projection of funding levels for the future. Based on a 14 percent relationship, which we have already said may vary, the backlog of investment in maintenance facilities in the past 30 years is Rs. 184 crores,\*\* which would amount to approximately Rs. 500 crores at current price. Not only has this backlog to be cleared, but adequate funds should be provided for future arisings. Annexure A-2.4 shows the backlog of investment in a graphical form.

26.5. The change in rolling stock holding by the year 2000 A.D. has been estimated by us later on page 134 Chapter IV. According to these figures, the additional rolling stock will cost approximately Rs. 7,000 crores over the 20-year period 1980-2000. On the basis of maintenance facilities requiring 14 per cent of the cost of stock acquired, it appears that about Rs. 980 crores at current prices may have to be spent from the Sixth, through to the Ninth Five Year Plan, for maintenance facilities. The exercise highlights that in each Plan period, an expenditure of the order of Rs. 245 crores would be necessary on additional maintenance facilities as against an average of only Rs. 22.5 crores spent in the past. This, then is the extent of additional funds mobilisation that the Railways will have to look for

† We estimate that if even 5 percent of the diesel locomotive main line fleet is permitted to remain overdue its annual preventive maintenance schedule, an additional 500,000 litres of lubricating oil is likely to get consumed at a cost of Rs. 60 Lakhs or so per annum.

\*\* See Table 2.7. 14 percent of Rs. 2,282 crores is Rs. 319 crores. As against this, only Rs. 135 crores were actually spent on maintenance facilities.



26.6 The figures given in paras 26.4 and 26.5 are to be taken as a guide. The actuals may vary as already indicated by us in para 26.3

## 27.0. Feonomies of project management.

27.1 it is not our intention to recommend specific investment levels only going by the cost of capacity creation in the past. We have noted that past investments have had an unsatisfactory tooth to tail ratio. A survey of some engineering units in the private and public sectors brings out that cost of mechanical engineering facilities is generally above 75 per cent of the total project costs. Railways facilities are in marked contrast, with the carriage and wagon workshops now being put up, having a provision of only about 25 per cent of their total project costs in direct capacity-creation of mechanical engineering facilities. We understand that machinery and plant has been the casualty in the anxiety to keep project costs low on the ground that not much can be done to reduce the cost of fixed structures, land development etc. Annexure A-2.3 brings out the machinery and plant, portion of maintenance projects.

27.2. The Production Units also do not show the same effectiveness of investment as in the non-railway sector. Table 2.9 gives the comparative position.

Table 2.9

### Cost break-up of selected projects

	<i>Mancheswar carriage workshop</i>	<i>Nasik Traction Motor Repair Unit</i>	<i>Bangalore wheel and Axle Plant</i>	<i>CLW</i>	<i>DLW</i>	<i>Public sector median*</i>	<i>Private sector median**</i>
Cost of Mechanical Engineering facilities Plant and Machinery as a percentage of Project cost.	24	48	67	53	63	83	79.5

27.3. We suggest, therefore, that in planning of maintenance projects, the share of machinery and plant is given adequate importance.

## 28.0. Balancing.

28.1. In creation of facilities, immediate past history will be misleading, while budgeting for the break-up of expenditure between the workshops and open line facilities, especially for coaches and wagons. Owing to lack of workshop capacity, railways have been forced to over-stretch, under most unsuitable conditions, the capabilities of open line maintenance infrastructure. In this process, the percentage of expenditure incurred on maintenance in the sheds, depots and sick lines as a percentage of workshop expenditure has been constantly going up, as the Table 2.10 indicates.

Table 2.10

### Ratio of expenditure in Open line to workshops.

Year	Steam locos (%)	All locos (%)	Coaches (%)	Wagons (%)
1950-51	77.7	77.8	28.5	67.8
1955-56	70.4	70.4	21.6	70.2
1960-61	98.2	97.7	27.6	94.0
1965-66	115.0	127.8	33.8	110.4
1970-71	123.5	153.0	33.8	106.4
1975-76	122.3	154.1	40.1	89.2
1977-78	138.4	165.4	43.1	97.8

N.B.—Source : RITES' Master Plan Study for Workshops.

28.2. In the scheme of maintenance, the diesel and electric locomotive sheds undertake intensive maintenance activity, and, to a large measure, this would have to continue. However, the maintenance of wagons and coaches, especially the latter, has primarily to be workshop-based.

28.3. We envisage stock being turned out of a workshop after overhaul with complete renewals of all wearing parts and high level of confidence for trouble free service up to the next overhaul. It would be more fruitful to proportionately increase the expenditure on design, repair technologies, and inspection, inside the workshops, rather than plan to undertake heavy maintenance work in the sick line as a routine measure.

28.4. Constant reviews will be necessary in future to ensure that open line maintenance is not permitted to mushroom as a fire fighting measure at the cost of a long term efficient systems plan.

## 29.0. Updating technology.

29.1. In so far as the actual technologies are concerned, the Committee would like to make certain broad observations :

1. Painting of wagons and coaches, especially the latter, represents the single most time consuming activity during overhaul, and limits the reduction in down-time. The Workshops, and even the Production Units, have still to adopt mechanised painting procedures. Further sophistication is possible by adopting newer technologies such as quick drying paints, electro static deposition etc. This is a major area for study and should receive serious and urgent consideration.
2. Corrosion on the railways has assumed gigantic proportions. Every six to seven years, heavy, time-consuming repairs are being done, which are both costly, and totally upset workshop out-turn since the capacity has been created for standard overhaul. Corrosion repair procedures need much deeper study and a preventive strategy evolved in consultation with other agencies. We also suggest that designers should examine the cost effectiveness

† This deals with coaches and wagons. For locomotives, see Part II. For cost of stock, see Part IV.

\* Figures for BHEL, Hyderabad, HMT Tractor division, Bharat

Pumps and Compressors, and Scooters found.

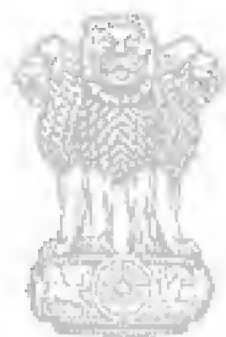
\*\* Figures for Mico Bosch, Gabriel Shock Absorbers, Escorts Tractors and Escorts Transmission Division.



of alternative materials, such as Corten Steel alloys, aluminium, stainless steel, fibre glass etc. This is discussed further in subsequent paragraph 30.

3. Although the Railways have now realised somewhat belatedly, the extent of maintenance requirements of roller bearings, they continue to adopt relatively antiquated procedures and

dimension that standard overhaul, especially of coaches, has been very adversely affected. Workshop capacities have been effectively reduced not only by the additional work involved, but on account of the difficulty in bringing any form of automation or standard repetitive and efficient methodology to the work. We have been informed that the Railways had become alive to the problem more than a decade ago when a coach parted into two halves while on the run. The implications on safety, therefore, are also significant.



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32.2. Although a scheme for modernisation of workshops has already been initiated, it has not been undertaken in a systematised manner. A technology plan should be formulated by COFMOW, and RITES should prepare detailed lay-out plans for each major workshop, and for those purposes the Railway Board must first clearly lay down a prospective programme for workshops in the light of our recommendations.

32.3. A Central Institute for Repair and Maintenance Technology should be set up to optimise repair procedures and each of the workshops should have an Industrial Engineering Cell to make optimisation and productivity improvement a continuous process.

32.4. The important inputs necessary are adoption of a well-planned unit exchange system, improvement of production control with suitable computer back-up, and updating of both manufacturing and repair technologies. The approach to the modernisation process should be on a systems basis including lay-outs, materials handling, ergonomics, machinery and plant, inspection arrangement etc., and not through a series of piecemeal efforts.

32.5. A nexus should be established between funds required for maintenance and procurement of additional rolling stock. In the workshops, capacity planning should be based on a continuous and realistic level of utilisation. Simultaneously maintenance projects need a critical look to ensure that the importance of machinery and plant as the most vital component of the total project expenditure is properly appreciated.

## ANNEXURE A-2.1

TABLE IV-A  
NUMBER OF POH CENTRES  
(RITES MASTER PLAN STUDY)

Type of Rolling Stock	Year				Percent change in POH centres from 1980 to 2000 A.D.
	31-3-80	1990-91	1995-96	2030-01	
BG Steam Locomotives.	8	4	3	1	(- )87.5%
BG Diesel Locomotives.	6	4	4	3	(- )50%
BG Electric Locomotives.	3	4	4	5	(+ )66.7%
BG EMU	3	4	4	5	(+ )66.7%
BG Coaches	12	12	11	10	(- )17%
BG Wagons	11	9	10	9	(- )18.2%
MG Steam Locomotives.	10	5	3	2	(- )80%
MG Diesel Locomotives.	2	2	2	2	...
MG Coaches	15	7	7	7	(- )53.3%
MG Wagons	16	6	6	6	(- )62.5%
Total No. of POH Centres.	85	58	54	50	
Total No. of POH Workshops.	45	36	37	37	
Ratio of POH/Centres/POH Workshops.	1.91	1.61	1.46	1.32	

N.B.—This plan takes into account an increase of rolling stock that we do not endorse. See para 8.1, 8.2 & 8.3

I. SHOPS WITH MORE THAN ONE ACTIVITY  
BY 2000 A.D.

1. Kharagpur	...	Electric Loco, Wagon
2. Kancharapara	...	Electric Loco, FMU
3. Charbagh	...	Electric Loco, FMU
4. New Bongaigaon	...	BG Coach, MG Coach
5. Jagadhri	...	Coach, Wagon
6. Gorakhpur	...	Coach, Wagon, Steam Loco
7. Izatnagar	...	Coach, Wagon
8. Mysore	...	Coach, Wagon
9. Hubli	...	Coach, Wagon, Steam Loco
10. Ajmer	...	BG Diesel Loco MG Diesel Loco

## II. SHOPS WITH SINGLE ACTIVITY BY 2000 A.D.

(a) Diesel Locomotives	(b) Electric Locomotives
Jamalpur Parel Goden Rock	Bhusawal Perambur (L)
(c) EMUs	(d) Coaches
Makalaxm Matunga Perambur (C & W,	Lower Parel Lallaguda Alambagh  Liluah Bhubaneshwar Tirupati  Ajmer (C & W) Jodhpur
(e) Wagons	(f) Steam Locomotives
Kurla Kota Pratap Nagar  Vijayawada Raipur Jhansi  Dibrugarh Bikaner New Shop	Dohad

## ANNEXURE A-2.3

INCREASE IN THE FLEET OF LOCOMOTIVES AND OTHER ROLLING STOCK  
(RITES MASTER PLAN STUDY)

S. No.	Type of Rolling Stock	Holding in 1980	Anticipated Holding in		Percentage increase in 2000 over 1980
			1980	2000	
1.	BG Steam Locomotives	4591	3097	1388	(- )70
2.	BG Diesel Locomotives (Main line).	1404	1787	1842	(+ )110
3.	BG Diesel Locomotives (Shunters).	340	1026	1817	...
4.	BG Elect. Locomotives	945	2264	3846	(+ )303
5.	BG EMUs	2300	4777	6964	(+ )202
6.	BG Coaching Stock@	41324	54421	71441	(+ )94
7.	BG Wagons@	420000	557530	723860	(+ )76
8.	MG Steam Locomotives	291	2782	821	(- )70
9.	MG Diesel Locomotives	429	1020	1609	(+ )270
10.	MG Coaching Stock@	26762	27304	29410	(+ )12
11.	MG Wagons@	115000	115000	115000	...

\* We consider these figures as purely illustrative. The Wagon holding is particularly questionable. Much would depend upon wagon design, and operational efficiency.

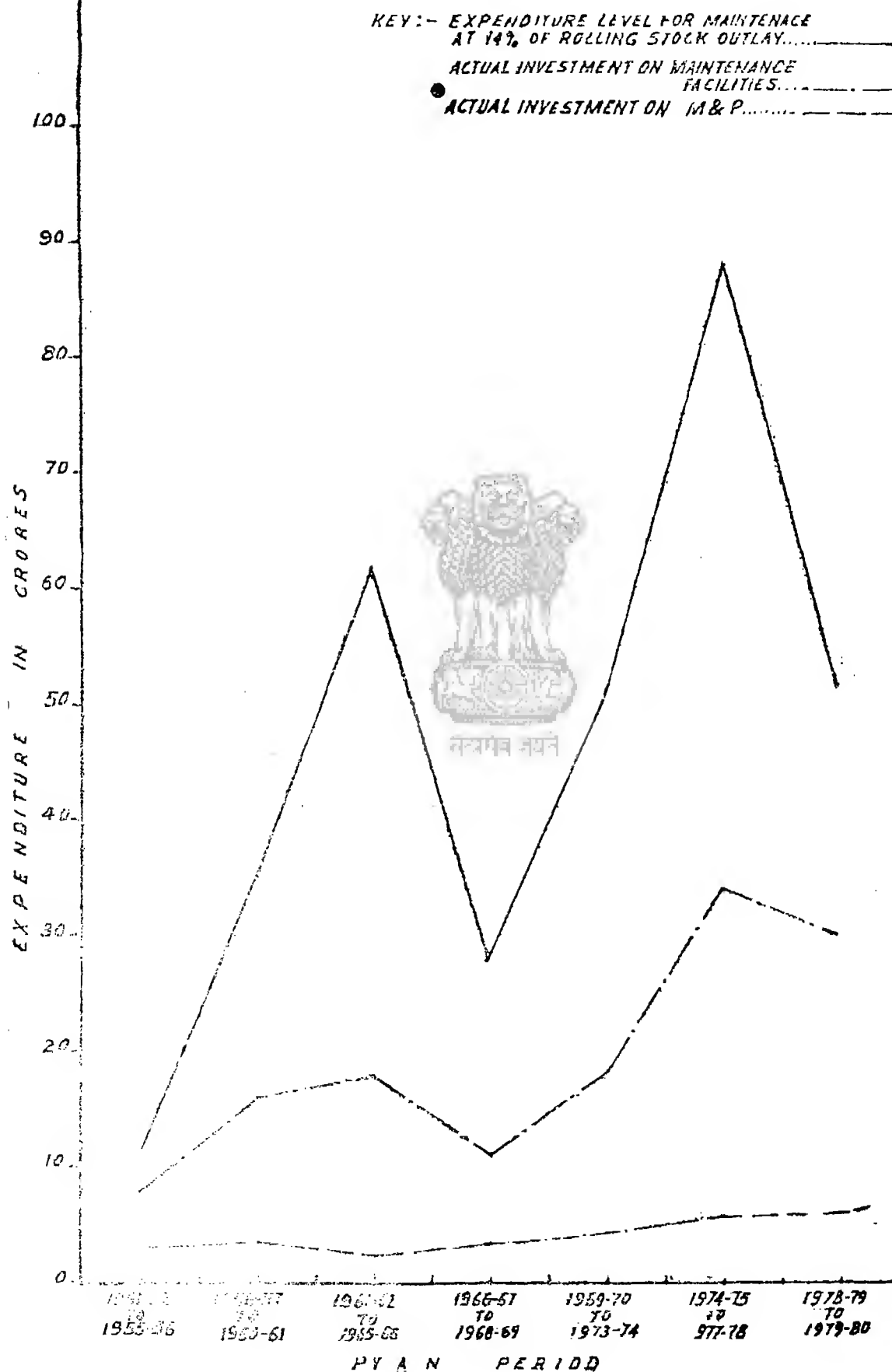
† See table 4.2, Chapter IV, for Commitment estimates

@ In four wheeler units.



ANNEXURE - A.2A  
 (Cf PARA 26.4)  
 (Cf PARA 27)

# EXPENDITURE ON MAINTENANCE FACILITIES





# CHAPTER III

## MAINTENANCE

### I. LOCOMOTIVES

#### 1.0. Introduction.

1.1. The motive power fleet has witnessed substantial changes in the past thirty years. In 1950-51, 8120 steam locomotives formed the backbone of traction. 72 electrics, operating over a limited area around Bombay, and just 17 diesels played a peripheral role. At that time, 93 per cent of the passenger train Kms. and 99 per cent of the goods train Kms. were on steam. Today, steam locos handle less than 49 per cent of the passenger and 21 per cent of the goods train Kms., with diesels doing 25 and 59 per cent and electrics 14 and 20 per cent of passenger and goods trains Kms. respectively. (The remaining 12 per cent of passenger train Kms. are on account of EMU services). Dieselisation was introduced for main-line work in 1957, while electrification, with a larger gestation period, remained virtually static between 1925, when first introduced, and 1960 when the first batch of imported electrics were put into service. Thereafter, steam locomotives began to play a visibly diminishing role, especially in the steel-coal belt and in the routes connecting the four metropolitan cities.

1.2. Nearly, 3,900 steam locomotives have been condemned since 1963-64 when steam had reached a peak holding of 10,810 locomotives. We have already recommended that an advanced phasing out of steam be undertaken, and suggested a production plan for their substitution in Part II of our Report\*, whereby complete change-over of traction can be achieved by March 1996. The first question that arises, therefore, is whether any additional inputs should be considered for these assets.

#### 2.0. Steam Locomotives.

2.1. In the past, heavy backlogs in the replacement of steam locomotives had built up but there has been a welcome reversal since the Fourth Five Year Plan. The pace of condemnation has been particularly vigorous during the past two years, and in 1980-81 about 440 locomotives were disposed of, as against 171 in 1979-80. In 1981-82, the figure further rose to 559, and, at present there are virtually no over-aged\*\* steam locomotives on line. These are preliminary figures and refer to decisions made and not necessarily physical transactions. Some of these may be reflected, statistically, only in 1982-83.

2.2. Table 3.1 gives the position over the past six years.

Table 3.1  
Condemnation of steam locomotives

	B.G.	M.G.	N.G.	Total
1976-77	97	41	10	148
1977-78	105	23	10	138
1978-79	72	22	...	94
1979-80	135	29	7	171
1980-81	267	170	3	440
1981-82	225	330	4	559

\* Chapter VII, Traction Policy.

\*\* Coidal life of steam locomotives is taken as 40 years.

† Indian Railway Specifications.

There were an estimated 6,880@ steam locomotives in service at the end of March 1982, and it seems that the role of steam over the next decade will continue to be significant. Their maintenance would, therefore, have to be looked after.

2.3. In the past two years, 23 steam locomotive sheds have been closed but about 250 remain. Instead of working to a plan, the closing down of steam shed facilities has been somewhat adhoc, and it has come to our notice that middle level managers have been frequently confronted with summary instructions. We consider that in regard to closure of steam sheds a phasing plan has to be drawn up, not merely in numerical but also locational terms. A limited number of regional workshops and sheds should be conserved instead of dissipating specialised resources over a large number of facilities with uncertain futures. As long as steam locomotives continue in service, they must be economically maintained at acceptable levels of availability. This process will be greatly aided by advanced condemnation of non-IRS† locomotives. While working out the overall traction plan, we recommend that the Railways shed the 'non-standard' locomotives before the end of the Seventh Five Year Plan, and, to the extent found practicable, even earlier. This would imply advanced replacement of seven classes of locomotives on the BG and about 10 classes on the MG, thus relieving maintenance of a considerable load. Table 3.2 gives an idea of the numbers involved.‡

Table 3.2

Type-wise arisings of steam locomotive condemnation

	1983-88		1988-93		beyond 1993	
	IRS	Non-IRS	IRS	Non-IRS	IRS	Non-IRS
BG	71	823	386	249	2,655	265
MG	Nil	267	275	147	1,660	14
Total :	71	1,090	661	396	4,315	279

2.4. While no other physical inputs are considered necessary, we have taken note of the denudation of the manpower base of steam locomotives to strengthen diesel, electric and other priority areas. Retention of skilled manpower on steam would have to continue with decreasing strength at least for 12 to 14 years. It may not be possible to totally stop induction of fresh blood at some places depending on local conditions. On the other hand, there may be difficulties in adjusting the surpluses against normal attrition. It is, therefore, necessary to examine the modalities of the transitional period.

‡ See also Part II of our Report on Transportation dealing with Traction Policy.

@ This figure refers to the estimated number actually in service For total holding see Annexure A-1.1,



### 3.0. Planning the transition.

3.1. Phasing out of steam traction will naturally bring into focus the issue of redeployment of about 63,400 maintenance staff. (cf. para 3.2, page 242 of Part-II of our Report). This is a very serious problem and will require deliberate implementation of an appropriate plan, especially devised for the purpose by a team of experts. The principal nature of the problems, as we have learnt from our discussions with the field officers in various zones and divisions, would include the following :—

1. The entire strength of maintenance staff thus relieved from steam traction cannot be retrained in view of the fact that though a certain percentage would be nearing the year of superannuation, there would be yet another percentage who would not have the requisite aptitude or educational background.
2. It has to be ascertained whether a percentage of the present maintenance staff should better be channelised into other areas of work requiring use of appropriate skills.
3. The whole range of locational and transfer problems is likely to complicate matters.
4. The need for continuing recruitment of candidates with requisite technical background in the maintenance categories will have to be taken into account.
5. The future of that portion of staff which cannot be retrained or retired will have to be considered.
6. A proper phase-wise action programme needs to be worked out, based on proper norms to meet the needs of the accelerated phasing out programme, as recommended by the Committee in Part-II. In many respects this would require a dialogue with labour.

3.2. These are problems which cannot be dealt with summarily and, therefore, we recommend that the Railway Board may urgently set up a group of Railway experts to go into different aspects of this problem and work out a redeployment programme consistent with the accelerated phasing of steam in keeping with the railway corporate objectives emphasised by the Committee in Chapter 7 of part II of its Report.

3.3. Along with the plan for closure of steam locomotive maintenance facilities, a detailed plan should be framed on the alternative use of the land and covered accommodation. One effective use would be for wagon maintenance, but this may not take up more than a small percentage of the sheds. A few sites can also be utilised to serve as diesel shunting bases. Yet there will still be much space left over. Sheds such as Bhusaval, Lucknow, Kazipet and Kharagpur, built to house more than a hundred locomotives each, cover 10-15 acres of prime land in proximity to major yards and railway stations. A land use plan on these surpluses should be drawn up bearing in mind the terminal requirements of the future. The need for new diesel or electric loco sheds could also be kept in view.\*

3.4. In the workshop, rationalisation and modernisation schemes will have to take into account concrete

traction plans, both on account of overall workshop load and the responsibilities for component manufacture. The important thing is the need for a systems approach and this would not be possible in the absence of a committed and detailed perspective plan. It appears to us that the present system of forecasting locomotive holdings, based on codal life, by-passes this issue, and gives no indication to the individual Zonal Railway and the Divisional authorities, of the redeployment time schedule. Such a plan therefore needs to be worked out urgently and carefully and widely circulated.

### 4.0. Diesel and electric locomotives.

4.1. At present, in some ways the organisational pattern of maintenance of diesel and electric locomotives has a close parallel with that of steam. Only two types of facilities have been created, viz., homing sheds and workshops. This does not appear to us to be the best arrangement, and, having evaluated the scope of maintenance work we recommend adoption of a four-part strategy.

4.2. We accordingly recommend the following plan :

Facility	Nature of work	Maintenance plan
1. Locomotive shed	Day-to-day maintenance.	Preventive on a fixed schedule
2. Workshop	Periodical overhaul.	Preventive on fixed schedule
3. Special repair	Accident damages.	Breakdown Scope variable
4. Rebuild	Refurbishing at half-life.	Renewal and uprating.

4.3. We have already commented upon the excessive time taken for POH. Tables 2.2 and 2.3 highlight the difference between theoretical schedules and the actuals. One of the reasons for the longer periods is mixing of heavy special repairs with normal overhaul. Periodic overhaul, which is done once in every six years or 800,000 Kms, is a closely controlled activity with standard work content, and is amenable to high productivity when well organised. Special repairs, on the other hand are these which are undertaken as a result of an accident, fire, or very severe consequential damage following failure of an important part. To prevent one activity being under-taken at the cost of the other, it would be desirable to separate special repairs from overhaul by organising separate and dedicated facilities. Understandably, since considerable overhaul work is also undertaken at the time of special repairs, they may be physically located separately but within overhaul workshop, so as to draw upon special overhaul facilities. The actual work areas, should however be exclusive, as also the labour force and management at the functional levels.

4.4. Rebuild† unlike special repairs, is an activity generally of a preventive maintenance nature, but the actual work content is more in line with that required for heavy break-down repairs. In routine overhauls, no work is envisaged to structural parts of the locomotives, such a recambering of underframes, replacement of imbedded piping, reflooring of cabs, renewal of fuel tanks, repainting from bare metal ect. All these items need attention within the life of the locomotive.

\* The Committee have noted that the steam loco shed at Balsa on Western Railway has been converted to an electric loco shed.

† No rebuild has been undertaken so far but has become due with the ageing of the earlier diesel locomotives.



4.5. In the case of diesel locomotives, there is an accepted concept of re-power-packing\*\*, half-way through the locomotive life, and quite obviously, rebuild facilities should be considered in tandem with this activity instead of duplicating equipment and increasing down time. This, therefore, dictates a logic on the full role of rebuild units.

4.6. Two diesel locomotive rebuild workshops may suffice for the entire country's needs; each being geared for about six locomotives per month in the final phase. Alternatively, on logistic considerations, two units on the BG and one for the MG may be preferable. These workshops would be akin to the production units and have, *inter alia*, specialised facilities to repair and re-machine diesel engines and bogies. Rebuild must result in some extension of life.

4.7. There is a spin-off advantage in the rebuild concept, in that it provides an opportunity to upgrade technology with newer models of assemblies and sub-assemblies, and uprating of power. Plant and equipment for major structural changes may, therefore, be concentrated in these units and the POH Shops not burdened with this responsibility.

4.8. The Committee understand that the Railways are considering the setting up of the first such unit as part of the Diesel Components Works at Patiala. In view of the fact that the earliest main line locomotives are more than 20 years old, this is a timely step. The requirement on electric should be studied to ascertain desirability of their rebuild on technical considerations.

4.9. The Committee are keen that the Railways may adopt the four tier concept in their locomotive maintenance programme. It will be appreciated from what we have discussed above that this concept would enable greater concentration of equipment and its optimal usage.

#### 5.0. Locomotive sheds : layout and systems.

5.1. By all accounts diesel and electric locomotive sheds are amongst the better appointed facilities on the Railways and, being of recent vintage, do not require the kind of urgent attention that the other workshops and sick lines so patently do. Their problems seem to arise predominantly from material shortages. We intend going into this subject in a subsequent Report.\* Nonetheless we have a few general observations about the nature of facilities and, management practices that may go some way in adding to reliability and effectiveness of maintenance.

5.2. While there has been some development in the design of locomotive sheds over the years, they continue to be essentially based on standard drawings issued by the RDSO more than fifteen years ago. As such, they do not adequately reflect the accumulated store of field experience. In specific planning exercises, it is difficult to substantially deviate from the standard RDSO plans, especially if it involves additional expenditure. These plans therefore need revision.

5.3. A major weakness in the existing layouts is berthing and working space. It appears that berthing space is traditionally provided on arithmetical calculations of effectiveness and scheduling percentages. This practice does not take into consideration the extent of

passenger services for which shed visits are more frequent. Peaking patterns have also not been empirically established. Furthermore, insufficient attention has been paid to the need for a large number of heavy spare assemblies having to be stored for speedy handling† under shed craneage, and not in stores depots. Over and above this, there is substantial requirement of heavy items, such as bogies, engine blocks, traction motors, generators, transformers, blowers etc. which are essential in the unit exchange concept. In most sheds, these storage requirements have been eating into working space that has not been specifically provided. The problem becomes more accentuated as the locomotive fleet gets older and needs increasing reliance on heavy repairs from outside the sheds. These features, therefore, need a fresh look.

5.4. Planners have also paid insufficient attention to the creation of a modern working environment conducive to efficiency and working in harmony. Staff continue to work in insufficiently ventilated rooms, often at rail level, and are constantly exposed to unhealthy exhaust from engines, compressors, etc. Lighting and noise pollution have received little or no attention. Workers wash-rooms, lockers and other amenities are not available to proper standards. In this context the Railways may seek advice of experts, if necessary even from outside. There are other inbuilt inefficiencies such as lack of comprehensive schemes for disposal of waste, machine swarf etc. which not only tie up considerable manpower and space, but can also be a major fire hazard. Swarf disposal from wheel lathes is one specific case, where efficient disposal can be arranged only by proper road approaches and weight-bridges as an integral part of the layout.

5.5. There is also need for development of standardised internal systems. So far little has been done beyond laying down of recommended scales for plant and equipment. Within individual sections there is considerable scope for improvement by scientific development of repair and stands, tooling packages assembly jigs and fixtures etc. All these are fields for industrial engineering which has been advocated earlier (Paragraph page Chapter-II). The sequencing of inspection and repairs under laid down schedules, with a view to optimising the down-time, has not had the benefit of a scientific study. Even standard arrangements for draining and recycling of lubricants, treated coolant water, HSD oil etc. which lead to loss, uncleanness and considerable waste of manpower, need to be looked into.

5.6. Lack of a modern outlook can be illustrated by referring to the number of unskilled hands operating in a shed. The formal yardstick is to have four unskilled workers for every five artisans and, given flexibility for local conditions, it is often 1:1. This reflects lack of appropriate handling aids and mechanisation, and, will only perpetuate a slow working and tedious system which has long since disappeared in modern industrial organisations.

5.7. We strongly recommend a comprehensive updating of layouts, facilities, and work methodology for diesel and electric locomotive sheds which would look upon the facilities as a unit and not just an assembly of activity centres. With two to three additional sheds required every year there is no time to lose.‡ A Study Group of experts could look into this problem within a

\*\* Replacement of the complete diesel engine.

\*This will discuss all aspects of material management on the Railways.

† Even some berthing space is more or less permanently taken up by Wagons loading or unloading wheel sets, Traction rotating machinery, high value scrap etc.

‡ The size of sheds does not materially alter this requirement, which is the minimum based on locational and type wise requirements.



matter of weeks, or alternatively, RITES may be engaged to do this work.

#### 6.0. Maintenance aids: data base and equipment.

6.1. The preventive maintenance scheme on diesel and electric locomotives has not materially changed in the past two decades. Very clear and well-defined norms are followed for parts subject to wear and tear such as piston rings, liners, cam shafts, valves etc. Performance of these items, therefore, is limited only by the extent of quality control during initial manufacture, fidelity of inspection, competence of maintenance staff, and the ability to keep up-to-date with maintenance schedules. There are, however, a substantial number of failures on locomotives, owing to parts which do not suffer discernible wear and tear but, nonetheless, have limited lives. Exhaust manifolds, fan drives, turbo casings, and to a lesser extent, roller bearings are examples of such items, which may fail due to fatigue or burning out.

6.2. In the interests of reliability, a policy of replacement of failure prone parts would be desirable even if their life cycle extends to ten years or more. It has not been possible to practise such a renewal policy for a number of reasons of which proper life monitoring is the most difficult under the present management methods. The problem is one of record keeping and management information. No existing manual system can adequately monitor the service life of hundreds of components on a fleet of 100 or more locomotives, and activate decision-making though routine and timely data retrieval. Parts are changed during nominated schedules, mid-course breakdowns, and alternatively overhaul or renewal may be deferred for many reasons.† Surveillance totally breaks down as components and assemblies are shifted from locomotive to locomotive through the maintenance pool.

6.3. Locomotive sheds would, therefore, profit by the availability of simple electronic data processing equipment. With the aid of simple and cheap desk-top micro processors, it should become possible to keep a constant survey of about two hundred critical components, and also help in simple statistical accounting and identifying cases of exception repairs. Locomotive-failures history is a particularly desirable data base that can be linked to particular artisans, supervisors, maintenance shifts, geographical deployment etc.

6.4. We shall be examining the scope of improvement in management information systems for a wide variety of applications in a subsequent Report. The Stores Depots attached to the locomotive sheds will necessarily need their own data processing facilities to eliminate physical transfer of issue and receipt notes to the Headquarters, main inventory computer system. The hardware chosen should therefore take into account the requirements of associated materials management systems in the sheds, so that it is not necessary to have two separate mini computer systems.

#### 7.0. Special plant and equipment.

7.1. By and large, the Railways have stopped obtaining specialised test and calibration stands from imported sources. In the early years of dieselisation and electri-

fication, such equipment was obtained from locomotive manufacturers abroad, but this obviously cannot continue with production being indigenised in DLW and CLW. Our Production Units, however, have not provided for the manufacture of specialised plant, equipment, and testing stands essential for locomotive maintenance. Individual sheds have, therefore, been fabricating these, not always to the requisite standard. The Railways should consider the possibility of centralised manufacture in one workshop to ensure quality standardisation, as well as design development.

#### 8.0. Shed management.

8.1. Owing to concentration of assets, diesel and electric locomotive sheds have been provided with gazetted management from the very outset.\* This has paid perceptible dividends, because of the better engineering methods, and has enabled a fairly smooth technology transition. Improved feed-back and speedy communication have helped in satisfactory performance evaluation modifications for local conditions, and a high degree of indigenisation.

8.2. The management scheme in these sheds, however has remained unchanged over the years inspite of well-recognised deficiencies. There has been tendency to increase the number of officers in accordance with the number of locomotives homed, but the system has not moved towards a rational division of management functions. It is understood that all the shed officers continue to be responsible for availability, quality, and manpower management, with work distribution entirely dependant upon the shed in-charge. Such a redistribution of functional responsibility remains to be done even where the number of officers has substantially increased during the last few years.

8.3. Industrial engineering has not been separately identified. This has resulted in a disjointed development of repair techniques. Furthermore, hardly any appropriate arrangements have been made for quality audit and productivity improvement. These are important aspects of good management. It should be possible to introduce these improvements without any general increase in the number of officers. The officers would, however, have to be properly chosen and given training for these special disciplines.

8.4. Budgeting and cost control are important and should be given the attention they deserve. The fueling installations attached to the sheds do not have any management supervision. According to an estimate, made from a few representative cases, an average diesel locomotive shed homing 100 diesel locomotives, has an annual revenue expenditure in excess of Rs. 3 crores with another Rs. 6 crores on lubricants and HSD oil. Electric shed also have annual budgets in excess of Rs. 3.5 crores. Collectively the forty-seven diesel and electric sheds in the country have annual expenditures running in excess of Rs. 225 crores, and this is obviously going to rise substantially in the future. The need for involvement of competent financial management is, therefore, self-evident.

8.5. We suggest that an Accounts Officer be provided at each of the major sheds in order to render prompt

@ Shortage of material and economic restrictions are the other factors.

† Non-availability of supply of materials, deferment due to operational difficulties like delays, summer rush, conferences etc.

\* Today, the average steam locomotive shed homes 28 locomotives as against 90 in the case of electric and 70 in the case of diesel. Many of the diesel sheds are homing more than 125, but the average is lower because of deployment for shunting. At a rough estimate, the diesel or electric shed has capital assets about twenty times that of its steam counterpart.



financial advice, whenever required, and provide competent cost analysis to these major expenditure points. This the Railways should forthwith arrange, by appropriate readjustment within the cadre.

8.6 The provision of attached accounts officers is also operationally desirable. At present, material indents running to about 3,500 items have to be prepared in the locomotive sheds and sent for financial vetting to Divisional and Zonal Headquarters, which are often located several hundred kilometres away. These distant administrative offices serve the needs of all departments and, being hard pressed, are unable to organise their priorities to match the legitimate needs of field operation. Maintenance time in sheds is specified in terms of hours to meet time-tabled services and should not be handicapped by dilatory procedures. The availability of locomotives each costing 70 lakhs or more must not be allowed to suffer such administrative delays. Decentralisation would also help local managements to make quick spot purchases where necessary.

8.7 To sum up on Shed management we recommend strengthening the management structure to cover :—

1. Industrial engineering and quality audit,
2. Local accounting and financial advice; and
3. Direct supervision of cost-intensive activities, such as fuel installations, re-refining plants etc. as well as for equipment maintenance.\*

## II. WAGONS]

### 8.8 Introduction.

1. The inter-dependence of wagon maintenance and goods train operation is so marked that we had, perforce, to refer to some maintenance aspects in Part-II of our Report on Transportation†: we also consider operational aspects fundamental to an examination of the maintenance strategy.

2. This correlation can be highlighted by mentioning that the deterioration in the late Seventies of the high level of performance achieved in the period 1976-78 was ascribed to a large number of wagons having become ineffective or 'sick'. Earlier, when operational efficiency had declined in 1970-73, It was ascribed as being due to large-scale theft of wagon components and indiscipline amongst the maintenance staff. Even the recent improvement in the lifting of originating tonnage seems to have come about through a careful segregation of good running wagons with roller bearings from plain bearing stock (which is more prone to sickness. In other words, wagon mobility has been optimised within the capability ceiling of each type. Moreover, a source of sickness which was hump-shunting has been reduced. Thus wagon condition and ability to move without developing difficulties enroute, have again played a major role in determining operational efficiency, even though the number of sick wagons has been going up on account of the continuing shortage of maintenance facilities.

3. Safety aspects are also vital. Involvement of wagons in accident is far more frequent than of locomotives and paches owing to the shed numbers of goods stock. There is heavy penalty to be paid in

accidents, not only through direct damage but also because of blockage of the line (s) and interruption to the flow of traffic. With increasing modernisation of traction the proportion of wagons having to be condemned on account of accidents is going up, because of higher speeds and longer trailing loads, thus further reducing effective capacity.

### 9.0. Wagon condition a survey.

9.1. In the early years after the Second World War the system had become fully extended because of deferred maintenance and the inability to arrange replacements. About eight per cent of the fleet was remaining ineffective. A strategy of high rate of replacement and additions during the Fifties along with closer attention to maintenance resulted in high modality and very good operating results over the next few years. Table 3.2 (page 87) gives an idea of productivity of B.G. wagons from 1950-51 onward.

Table 3.2

Productivity of B.G. wagons

Year	Ineffective Wagon percentage	Kms. per wagon	NTKMs. wagon day	Turn-round day
1950-51	7.28	61.92	694	..
1954-55	6.79	69.28	772	16.8
1958-59	3.35	72.36	916	18.40
1961-62	3.19	76.10	973	11.50
1964-65	4.35	72.00	921	11.90
1967-68	4.09	71.50	889	12.60
1970-71	5.11	73.10	907	13.30
1973-74	4.36	67.20	837	15.00
1976-77	3.99	81.20	1019	13.00
1977-78	3.98	81.90	1045	13.30
1978-79	4.34	75.90	976	14.30
1979-80	4.43	73.30	972	15.10
1980-81	5.30	73.40	986	15.20
1981-82*	6.35	83.70	1112	13.30

† Provisional

9.2. Two new factors in the environment after the Third Plan again reversed the trend towards improvement. These were widespread indiscipline and mass scale of theft of components. Curbing of both during the mid Seventies led to another upsurge in performance. Thereafter there has been unsteady performance with the re-emergence of these features in varying degrees. In the past two years, however, a new operating strategy as explained above, has been implemented which takes into account inherent strengths and weaknesses of stock and, therefore, once again highlights the inter-dependence of operation with wagon condition.

\* According to the Maintenance Manual for electric locomotives, 150 items of important plant and equipment in addition to 140 laboratory apparatus are assessed to be the bare minimum

Complement to be provided in a locomotive shed apart from general purpose tools, meters, measuring devices etc.  
† Paragraph 12 page 181 "Patterns of examination".



### 10.0. Movement patterns.

10.1. The new patterns of operation with emphasis on block rake loading and point-to-point traffic has tended to reduce the share of small and single four wheeler wagon loads and improved the utilisation of block loading stock. Roller bearing and plain-bearing stock has been separated\* with the latter being preferred only for short-lead traffic. This has increased the utilisation of the newer and heavier part of the fleet and has also helped to increase the pace of replacement.

10.2. The bulk mode would increasingly predominate and we have envisaged 80 to 85 per cent of the total traffic handled by the Railways being of this nature. Wagon maintenance, therefore, has to be seen against the special requirements of this type of movement, which largely eliminates constant make and break of trains.

10.3. The Railways should be planning to run heavier and longer trains of 4500 tonnes and later even 7500 tonnes. This further underlines the need for strengthening wagon maintenance simultaneously with other measures to introduce such services. The probability of a wagon being capable of running to destination must be brought up to near fail-safe standards, if the heavier trains are not to be counter-productive, because any stoppage or detachment will involve heavy detention and loss of revenue. It follows that locomotives and wagons in future will have to be individually far more reliable if the full potential of this important advance in operating techniques is to be effectively realised.

10.4. The future policy in respect of design, manufacture, maintenance and management must be framed in the context of the projected patterns of train operation. Larger trains dictate higher wagon reliability, brake efficiency and quicker marshalling capability.

10.5. Most important of all, perhaps, is the need for enforcement of discipline in the schemes of maintenance. Taking into account the needs of the system and basic wagon capability, a maintenance strategy is to be evolved and given higher sanctity than at present. Wagons, unlike other form of stock do not have a 'homing' base and, unless maintenance schemes are faithfully implemented, it becomes virtually impossible to prevent rapid system deterioration. This is one of the major lessons to be learnt from the past.

### 11.0. Wagon replacements : total life.

11.1. We have already discussed in Chapter I the lack of adequate replacements that have resulted in a rising age profile of the wagon fleet, and consequently increasing numbers which are beyond economic life. We had accordingly recommended\* that the backlog of such wagons should be cleared in two years, which is well within the wagon manufacturing capacity in the country. It is learnt from the Railway Board, that as per actual plans, a rather long phasing out has been planned that would leave 17,000 wagons overdue replacement even at the end of the Sixth Plan. The Committee do not appreciate the reasons for this overly conservative approach, and would point out that the results achieved by segregation of the newer portion of the fleet, from the old and run down plain bearing wagons are a clear pointer

to the need of sustaining a vigorous rate of replacement and rapidly restore health of the fleet.

11.2. Table 3.3 gives an idea of the rate of replacements over the past few years.

Table 3.3

#### Condemnation of overaged wagons

(Figures in 4-wheeler units)

Year	Number of condemned wagons	
	Broad Gauge	Metre Gauge
1976-77	3,085	1,541
1977-78	2,185	1,472
1978-79	2,420	1,494
1979-80	2,842	1,634
1980-81	8,773	2,704
1981-82*	14,000	4,500

\*Figures provisional

11.3. Table 3.4 (page 91) indicates the time frame of replacement requirements. In this context we may briefly refer to what we had recommended in Part I of our Report that, "regarding wagons, the Railways should reasonably be in a position to become current by the end of 1983-84". We had made this recommendation in May, 1982 and as we have already reached end of 1982, the Railways must now ensure that this backlog is wiped out at least during three years or in other words in two years from now. In this context we may emphasise that this should not be considered a very heavy responsibility, as the arising in the last year of the Sixth Plan will be less than one thousand wagons.

Table 3.4

#### Replacement Requirements (in 4-wheeler units)

	B.G.	M.G.
Overdue on 31-3-82	@23,723	4,323
Arising 82-84	7,767	509
Total	31,490	4,832
Arising in 84-85	807	155
Grand Total	32,297	4,987
Average annual condemnation necessary from 82-83 to 84-85	10,765	1,662

11.4. We are emphasising the need for replacement as an important factor in the operational strategy for the future. The wagons being condemned are of plain bearing four-wheeler stock, giving poor output, often not freely loadable,\* and incapable of meeting the pattern of operation that is to increasingly dominate the future scene. The replacement received is a bogie wagon of higher capability that is suitable for substantial increases in throughput without concomitant increase in numbers.

\* The process should be completed hundred percent as early as possible.

\* See para page Part I.

\* The distinction between "fit" and "freely loadable" must be

dispensed with. This only causes statistics conflation and gives a false idea of transport capacity.

© See also Part , page . The figures given here are the latest obtained from the Mechanical Directorate of the Railway Board.



11.5. Replacement by itself will not be enough. The Railways will have to take care of the need for somewhat early phasing out the 4-wheeled wagon. In this context we may reproduce para page of Chapter V of Part II of our Report :

"3.7. The Term 'wagon' in common parlance refers to a large number of conventional four wheeler wagons-both covered and open-lying in the circuit today. These wagons impose an inherent restriction on speed as they are not capable of being run at higher speeds. They also impose serious constraints on marshalling. With the transition from wagon to rake load, for over three-fourth of total national rail-borne freight, the Railways should now programme to phase out the four-wheeler, and make the eight-wheeler bogie open or covered wagon the unit for wagon-load movement, which also will have an important role to play for around 15 to 20 per cent of the total freight."

It will not be proper to link up this phasing out plan strictly to the codal life of the wagon in view of the deleterious effect of carrying the so much 4-wheeled stock, much of which is in a state of bad repair, old and are not freely loadable. After executing the phasing out on codal life 54,500 4-wheeled wagons would remain in service on BG and 3,300 on MG by 2000 A.D. This is a very large number and the question, therefore, arises whether any advanced condemnation of these four-wheeler wagons should be considered.

11.6. We have analysed the maintenance work-load in relation to age of overhauled BG wagons. Table 3.5 page gives the figures based on an analysis of a three month period in 1980-81 from Jagadhri Workshops of the Northern Railway.

Table 3.5  
POH man-hours per wagon in various age groups

Type of wagon	1-5 years	6-10 years	11-15 years	16-20 years	21-25 years	26-30 years
BOX	52	174	191	257	213	N.A.
BCX	44	81	90	96	66	N.A.
CV & CA's	N.A.	168	373	429	504	444
KC's	N.A.	N.A.	388	593	558	514

11.7. Co-relating the above figures with our discussions during visits, we find that corrosion repairs become essential every 7 to 8 years and the number of man-hours for overhaul reach a peak at about 17-18 years of service after which there is once again some decline in the quantum of work necessary. At first glance the figures of table 3.5 would tend to support 35 years, as adopted now, as a rational norm for fixation of codal life although it is possible that the figures are somewhat distorted by the fact that more than one quarter of the fleet is overdue POH.

11.8. We have checked these figures against past performance and find that, from the same workshop, man-hours per four wheeler wagon have gone up by thirty per cent in the case of covered wagons and seventy five per cent in the case of open wagons, compared age for age, as against the figures of the early Sixties. Table 3.6 page brings out the remarkable increase that has taken place.

Table 3.6

Four-wheeler covered wagons

Age Group	0-10 years	11-20 years	21-30 years	31-35 years
Average man-hours of September 1963.	205	318	348	381
Average man-hours of June to Aug. 1981.	168	412	472	467
Percentage increase	...	30	35	22
Four-wheeler open wagons				
Average man-hours of Sept. 1963	175	275	334	346
Average man-hours of June to Aug. 1981.	...	581	535	533
Percentage increase	...	110	60	50

11.9. While some of this sharp rise in man-hours may be accounted for by poorer staff discipline, a substantial portion is also attributable to the number of modifications being made to strengthen the design of these old wagons in accordance with current needs. In the background of future requirements, this is an unwise investment and the Railways should not persevere to marginally extend the life of the old design of four-wheeler wagons. It would be better to go in for advanced condemnation of four-wheeler wagons, and, if their codal life is reduced to 30 years from the present 35 years, only about 23,000 out of the 54,500 would remain in service by the year 2000 A.D. These would be only roller bearing wagons and could be used until they are discarded in the normal course of things. The Railways should, in any case, make a further review during the Eighth Plan.

12.0. Handling care.

12.1. Wagon condition depends, to a considerable extent, on the care bestowed on it during usage. It is, therefore, necessary, before going into the question of maintenance, to spell out the importance of discipline on which much greater emphasis is necessary than has been given hitherto. Some of the major aspects are :

1. **Hump damages.** It is apparent from Table 3.5 that BCX wagons require considerably less repairs than BOX wagons, inspite of additional structural details. This, to a large extent, is the result of the much lower frequency of humping of BCX wagons. While the operating strategies now emerging would go a long way in reducing the incidence of humping of such stock, even for non-bulk traffic, care will have to be exercised through better yard management and technologies to eliminate damages altogether during classification.
2. **Over loading.** On various justifications, overloading has frequently been resorted, to but at enormous cost to the system. The Sikri Railway Accident Enquiry Committee had quoted cases when as much as ten to twelve tonnes of over loading had been found on super checks. In such conditions the often quoted safety margins in wagon design become irrelevant. Overloading seriously reduces the life of critically stressed components such as roller bearings, springs, hangers and welded joint.



Failure of these components is sudden, and results in costly and time consuming wagon detachments, which cannot but adversely affect the traffic throughput. Overloading also affects safety and the life of permanent way. The recommendations made by us in Part I of our Report to reduce and eliminate overloading will go a long way in eliminating this problem.

3. **Corrosion prevention.** Detention should be minimised on wagons loaded with corrosive materials like ash, specially in the unbagged condition. Major control is necessary on departmental wagons that tend to be left loaded with corrosive material for extended periods.\*
4. **Placements and withdrawal.** It must be ensured that, as and when required, stock is moved promptly to nominated repair points and removed quickly after the work has been completed. It is learnt from discussions with officers in the field that the total non-availability period on account of maintenance in the sick lines can be upto four times the actual maintenance time, on account of the slack before placement and again for re-amalgamation with outward loads.
5. **Thefts.** By the early Seventies theft of wagon components had assumed alarming proportions. Steel prices made it profitable for anti-social elements to remove any item which could be re-rolled or melted. Items such as brake beams, brake hangers, brake blocks and screw couplings have been particularly vulnerable. The situation became so bad that workshops had to deploy staff to remove these fittings in the adjoining yards to prevent theft during the period the wagon was awaiting placement. This totally upset workshop schedules and created severe logistical difficulties. On the Divisions, there has been a tendency to remove these fittings before despatch of a wagon for POH, so as to make good shortages arising out of similar activities in the yard. Obviously no system can plan for thefts and losses beyond certain levels and the sharp deterioration in performance in the early seventies bears testimony to the savage impact of lawlessness. The ineffective figures do not, and cannot, fully reflect this position because of the system of accountal. The Committee have come to the conclusion that the system of accountal is not fool proof and is rather understated. There is no way of checking short accountals in different pockets and areas in the field. Overall, these figures did not look to be very reliable. The position should improve once accountal starts at a computerised network on the Railways about which we will make recommendation in a subsequent report.

(b) The Railways have not been able to remedy this situation despite some attempts to adopt anti theft modifications. The problem can be effectively tackled only by strong law and order measures, and can be internally aided mostly by ensuring that wagons are not left stationary for excessive periods at points which are difficult to guard and supervise.\*

### 13.0. Maintenance strategy.

13.1. Maintenance strategy should be based on a clear sub-division of work required to be done between workshops, sick lines, and yards. We recommend that the maintenance plan may consist the following :

1. Workshops, to do POH only.
2. Sick lines should handle routine repairs. A few nominated sick lines have to be further developed to handle heavier repairs arising from accidents and misuse.
3. Yard repairs to be specifically organised to maintain train integrity and minimise detentions.

13.2. The Chinese Railways have adopted with some success\* an additional preventive maintenance concept. An annual maintenance schedule is undertaken in specially nominated workshops, during which there is complete overhaul of the bogie, centre buffer coupler assembly, and the brake system. The Committee would advocate serious consideration of this concept for wagons moving in high density closed circuits. Such work can be organised in one major depot and the efficacy of the system watched before a final decision is taken.

13.3. In the scheme of things given above, it is expected that the workshops would ensure that each component is restored to a new state, or as close to it as possible, and ensure its reliability until the next preventive maintenance schedule at a 95% confidence level.

13.4. The Workshops should also have responsibility for supply of spares to the open line facilities ; the extent of dependence on trade purchases may be fixed by the Production Directorate@ depending upon circumstances.

13.5. On the open line, the backbone of the system is periodical examination. This is an area requiring a great deal of analysis and rationalisation. In principle the attempt should be to offer, wagons for intensive examination, and nominate them for sick lines in the empty direction only. We must emphasise that repair to loaded wagons should not form a routine part of the system. The nominated examining points should normally be in major yards controlling feed to a large number of loading points. In the remaining part of the wagon turnaround cycle the wagons should be examined at predetermined and specific distances, bearing in mind the need to reduce these to the barest minimum.

13.6. We found that, in the recent past the practice of taking wagons in for POH on the basis of due dates has been superseded on an adhoc basis. This, goes against the principle of preventive maintenance. We would like to sound a note of warning that this is a palliative with a very temporary remedy, and in the long run will have its own penalties. Allowing maintenance to run into arrears may become a big problem later. The correct answer lies in making good the shortfalls of the past.

\*Corrosion prevention from the aspect of design has been discussed later in this chapter, and also in the previous chapter. Cf. Paras 29 & 30, pages 58-61). We shall be covering security aspects in a subsequent Report.

\* Report of the Indian Railway Delegation to China, June 1982.

@ See Chapter IV, Paragraph 9.01.



#### 14.0. Train examination.

14.1. In order to ensure faithful implementation, there is need to evolve All-India train examining orders which will ensure that, on the one hand, there is no redundancy on account of repeated examinations at short intervals, and, on the other, train loads do not by-pass examination beyond specified limits. These orders can be issued only through a joint study by the traffic and mechanical branches of the major operating streams. The location of facilities should be detailed with projected patterns for the future.

14.2. This would still leave some uncovered gap because of non-standard movements and the dynamics of an operating situation. For this a marginal structural change may be necessary. The inter-dependence between operation and maintenance has been recognised fully in the case of locomotive operation, in-as-much as the Additional Chief Mechanical Engineer (R&L) is always involved in the planning of locomotive movement and nominating the maintenance points base shed, outstation depots and so on. Formal links are drawn up and even where link working is not possible, the movement of the locomotive is watched. A similar organisation does not exist on the carriage and wagon side. While rake links do exist for coaching stock, rake integrity has generally been a casualty in the case of wagons. The C&W department usually has no idea of the history of train formation and earlier attention on other divisions and Railways. This clearly points to a need for a running department on the C&W side to work under the Chief Rolling Stock Engineer but in real-time synchronisation with the operating departments, to monitor the movement and maintenance of goods trains. The methodology already in use for diesel and electric locomotives, has to be extended to other rolling stock. In due course the Computerised Operations Information System will provide a ready infrastructure for this, and it will be sensible to deal with the same needs through conventional information channels until the O.I.S. is fully implemented.

#### 15.0. Sick lines.

15.1. Work has to be so divided, and the scale of facilities so designed, that no wagon is in a sick line for more than 24 hours. At present, the number of lines in sick lines vary and the lines are often earmarked separately for various types of repairs. Having taken into account the various types of work load, we feel that it should be possible for the sick lines to be provided generally with four lines\* only, each set of two being earmarked for placement during a particular shift. Of the two lines, one should be earmarked for wheel and lifting, and the other for general repairs. The yard pilot should segregate the stock between these two major types of work at the time of placing which should be done twice a day. Multiple shunts for several types of repairs should be prohibited and the yard pilot should work to fixed timings for placements and withdrawals twice a day. Double shift working should be adopted as the norm, and lie-over of wagons altogether forbidden. Wagons estimated to require more than two shifts of work may be earmarked for the heavy depots where the scale of facilities would be appropriately superior.

\* Those sick-lines that are nominated for heavier accident repairs also would of course need a separate area and track for this work.

† We have strongly recommended that the Railways must stop undertaking short-lead and highly dilatory and uneconomic

15.2. As early as 1973, a Special Committee had identified the inputs necessary to modernise sick lines. They continue to remain, however, the most neglected and archaic engineering facilities on the Railways. We recommend that a programme to implement the suggestions of the Committee is drawn up without too much concern for updating since the parameters are largely unchanged.

15.3. The major features would be :

1. Levelling and provision of concrete aprons to ensure mechanical handling of material and easy lifting.
2. Adequate lifting arrangements both for complete wagon body and quick jacking of one end.
3. Covered area and proper lighting.
4. Provision of wagon pulsers for accurate placements and arranging working space.
5. Fork lift trucks for movement of heavier components such as brake cylinders.
6. Adequate compressed air supply and welding points.

15.4. In addition to the above, the following facilities are considered important :

1. Portable platforms for ease of working at various levels.
2. Standardised high quality tooling with proper arrangements for re-coupling and repairs
3. The number of spare wheel sets have to be realistically fixed and movement between workshops and sick lines/depots streamlined.†

15.5. Pit type wheel lathes should be provided at points likely to have arisings of about fifteen wheel sets per day. This requirement is not likely to exceed one or two per zonal railway. The remaining sick lines, may continue to be provided with floor type lathes. The organisation of work on wheel sets is a subject that will require detailed study. There are a number of highly graded sections where wagons are dedicated to a closed circuit movement. The wheel wear on these can be such that their life cannot span the inter POH period. Where these sections are located very distantly from base workshops, road movement of wheel sets is clearly not economical. The Railways may, therefore, consider setting up wheel pressing facilities in one or two major depots. An example of such a location is Waktair for K.K. lines iron ore wagons. In other cases, the justification may arise out of clustering of locomotive sheds and EMU services in one area : Delhi is a good example of such a point where the feed from Amritsar or Lucknow workshops is difficult to sustain in a block-rake movement philosophy. A cost-benefit analysis for decentralised facilities should be undertaken for one or two such areas and the conclusions made implemented wherever required.

rail movements for their own material, particularly in major rail complexes (Cf. para 16.4.1, page 193 of Chapter V, Part II). For such movements, the Railways should undertake road movement, on their own, or through the road haulier. This will both expedite and improve the reliability of supply.



### 16.0. Yard repairs.

16.1. The third type of maintenance facility envisaged is at the departure and transit yards.\* In future these should be laid out to allow for mechanised servicing of individual wagons to avoid detachments. If possible in the departure yards every third line should be left free to provide a rail level surface for movement of a tractor trolley carrying a portable compressor, hydraulic jacking apparatus, welding sets and necessary materials such as springs, shackle, bolts, clamps, etc.† It is expected that with a higher level of workshops attention, better traffic handling and greater controls in workshops and depots the extent for yard repairs will be minimised. These however cannot be entirely eliminated and the attempt should be to provide essential safety repairs within the permitted examination time. It is wasteful for such examinations to result in detachments on train formations. The problem of remارشalling of longer trains in future, will provide sufficient justification for these marginal inputs.

### 17.0. Ancillary aspects and staffing patterns.—

17.1. At present, between 1-1½ percent of the wagon fleet is being marked sick everyday. Of this, preventive maintenance is only 0.2 percent for roller bearing stock and about 0.6 percent for the others. We consider that the rate of sick marking can be considerably reduced and overall ineffectiveness kept below the four percent target, provided preventive inspection and maintenance is given due emphasis. This will not only help in achieving these targets, but add considerably to reliability and help in obviating the distinction now made between 'fit' and 'freely loadable'.‡ In order to do so, some structural adjustments are also necessary.

17.2. We have already stated in paragraph 10.5 that the need for discipline is paramount. Later in paragraph 14.2 we have recommended the setting up of a 'running' organisation under the CRSE, to later form an integral part of the Operation Information System. The ultimate rationale is that wagon maintenance has to be established simultaneously through a single order of the COPS/CRSE. Train numbering must contain the essential maintenance information so that, for a large body of movements that do not conform to the repetitive bulk loading streams, clear examination points are prescribed at the time of route planning and not left to unscientific and contrary pressures from field operating and maintenance managements separately.

17.3. An unfortunate controversy has been raging, for many years, on the distance a rake can travel without the need for re-examination. It is generally agreed that inter examination distance should be as high as possible, but this has necessarily to be related to inherent wagon capability, which is a product of basic design, material quality, adequacy of facilities and external factors such as theft, law and order etc. The RDSO have conducted trials of brake power deterioration and published their findings vide their report No. 6252.01.012 whose salient conclusions are reproduced in table 3.7.

\* Through yards where intermediate examination is required, normally to coincide with engine/crew change.

† In the transit yards where there may be only four or even two lines suitable paving between tracks is the answer.

‡ As the 4-wheeled stock become increasingly less versatile, the

Table 3.7  
Brake Power Deterioration

Distance travelled	Percentage of brake power deterioration		
	Maintenance by RDSO on test rake	Railway's routine maintenance	Mean value
Upto 400 kms.	6.5	16.0	11.2
Upto 800 kms.	14.2	23.8	18.5
Upto 1000 kms.	18.0	27.4	22.4

17.4. Two points are worthy of note. Firstly, the difference is so large that the performance of routinely examined rakes cannot justifiably be accepted for yard stick purposes. On the other hand an over-night raising of inter examination distance, is fraught with grave implications on safety. There has to be a gradual increase based on periodical reviews that permit the organisation to adjust itself to newer systems. We consider that a few hours of examination will not mount up to any substantial component of a wagon turnround that is still averaging more than 13 days.

17.5. In this context, it will be appropriate to reiterate the specific recommendations made by us for adoption by the Railways in Part II of our Report : §

1. A system of maintenance, which would permit a movement pattern, allowing the wagons in a rake to roll over distances of 1,000 kms. without requiring any examination, upto 2,000 kms. with only one vacuum-upgradation and beyond 2,000 kms. with two vacuum-upgradations.
2. Creation of requisite facilities at the terminals for examination.
3. Development of wagon designs which will promote such movement-patterns and such train examination systems.

17.6. Staffing patterns for carriage and wagon examination appear to be very antiquated. These are still based on yard sticks issued in 1956 when the average train load was 9-10 coaches or 40-50 wagons., Not only has the trailing load gone up substantially but the variety and sophistication of stock has increased. Table 3.8 below is indicative of the change during the past three decades.

Table 3.8\*\*  
Trailing Loads

Year	(Figures for BG) Average train gross load (in tonnes)
1950-51	1,068
1955-56	1,146
1960-61	1,354
1965-66	1,470
1970-71	1,509
1975-76	1,577
1979-80	1,694
1980-81	1,721

Committee have found that the Railways use a system of stencilling such wagons as fit for loading of only certain specific commodities. While this has, by and large, not reduced the availability of the 4-wheeled stock, for loading, this certainly complicated the difficulties in movement.

§ Cf. para 12.4, pages 182-183, Chapter V of Part II

\*\*Source : Indian Railways Year Book 1980-81.



17.7. Discussions with field managers has revealed that the number of staff provided for train examination is insufficient to do justice to the present length of trains within the time allotted. This matter should be examined through a proper work study. We do not recommend that staff increases should be made in isolation. There will be surplus of maintenance staff, *inter alia* from the phasing out of the 4-wheeled stock and, if the pace of such phasing out is accelerated, the release of surplus staff will be even higher.

17.8. This would require a little explanation. In the maintenance of 8-wheeled stock, certain type of work as in 4-wheeled stock is not necessary. The more important amongst these include such works as periodic repacking and oiling of axle boxes, replacements of brasses, rivetting of axle guards and other components etc. We would recommend that the range of surplus staff, as will be available should be computed by the same Group of Expert as we had suggested for dealing with the redundancy of steam maintenance staff in paragraph 3.1 ante. Such staff should be redeployed in the marshalling and classification yards.

#### 18.0. Flexibility.

18.1. We are informed that workshop capacity is not only defined in units but is internally sectionalised by limiting capacities for different types of stock. Thus, the capacity of a workshop, by way of example, is fifty units per day only if these units can be offered in a certain mix of bogie wagons, four wheelers, tanks, brake-vans, etc. To some extent, this is unavoidable. It has, however, reportedly led to a number of unhealthy practices and considerable difficulty to adjoining divisions.\*

18.2. Workshop capacity has to be geared to a certain mix of types depending upon their proportion in the holding but this cannot be made sufficient reason for workshops to try and pick wagons from the traffic stream. Whatever adjustments are necessary may be done from the shop pockets, which should be fed strictly on considerations of arisings. Under the best of management intentions since this feed cannot always match the special capacities of workshops internal design, workshop engineers should examine the possibility of more flexible layouts.

18.3. We believe it should be possible to achieve greater flexibility, provided :

1. The lifting arrangements and space between the lines is geared to the heaviest type of wagon, viz. the bogie type.
2. Sufficient unit exchange spares are built up and kept ready for use. This is especially applicable to wheel sets, bogies, brake rigging and bearings.
3. EOT cranes are provided in sheds of suitable height so that wagons can 'jump' the queue.
4. In order to ensure uninterrupted out-turn of wagons irrespective of variations in the mix of types, it would be necessary to make production control more sensitive. The description of the incoming wagons, viz., BOX, BCX, tank wagons should be quickly communicated to the various repair and fittings

sections to ensure timely availability of materials of the required types.

5. A change has to be made in the manner in which the out-turn targets are prescribed to workshops management. Instead of specifying these targets in terms of traffic units, which do not bear relation to the actual work content, they should be specified in terms of 'equivalent' units, based on standard man-hours.

18.4. For all time to come, the Railway must except a fair variety of freight stock in contrast to locomotives and passenger carriages. We have, in fact, stressed the need for dedicated wagons for most of the bulk traffic. In such an environment, the whole approach to FOH organisation has to be different in the case of wagons, where the work involved widely varies depending on design, type and usage. The proposed Institute of Maintenance Technology should develop maintenance system to achieve this end without sacrificing efficiency and productivity.

#### 19.0. Design aspects.

19.1. There are certain aspects of design which have far reaching implications on performance and maintenance strategy. While the type of wagons will have to be identified by major system considerations, we would like to touch upon some of the present weaknesses that should be taken into account for future production.

19.2. Heavy corrosion damage is being experienced because of wagon fabrication from normal structural steels. It is understood that RDSO has been specifying copper bearing steels covered by IS specifications for many years, but this is being repeatedly relaxed owing to non-availability of such steels from indigenous sources. We had convened a meeting with Secretary, Department of Steel in September, 1982 during which Chairman, SAIL and the Managing Directors of Bhilai and Durgapur Steel Plants were also present, in which this matter was taken up. Later, at the end of November 1982 the Secretary Steel has confirmed that copper bearing steel sheet does not present any problems, and in fact, an expert group has been formed to develop 'Corten' steel. It is therefore essential that relaxations on material specification for wagon fabrication are immediately withdrawn.

19.3. Brake equipment is perhaps the single biggest source of unreliability. While the Railways already have a policy of future reliance on compressed air brakes as against vacuum brakes used in the past, we would like to caution that on-going research and development will be necessary to ensure reliability of brake valves under Indian conditions of operation and material technology. Experience on locomotives highlights that the performance of indigenously manufactured air brake equipment is of poor quality and needs a great deal of improvement. This should extend to brake gear as a whole, including the wear rate of brake blocks and the reliability of slack adjusters.

19.4. The fabricated UIC† bogie, which has been adopted as the staple bogie for wagons has not lived up to expectations. In spite of many modifications, welding failures continue to be heavy. Some part of the problem may lie in the quality of welding and the extent of over loading, but it has increasingly come to be accepted

\* There is a tendency amongst workshop personnel to pick and choose 'easy' wagons. This is done by the employees posted in the Shop pockets, and some times even by sending out

staff to feeding yards. The net effect of this is deleterious as it piles up arrears of wagons requiring genuine repair.  
† Union Internationale des-Chemins-de-fer.



ed that under Indian track conditions a sturdier design is called for. This matter should be examined in depth. A large number of welding failures are being detected on loaded wagons and it is impossible to give reliable repairs under this condition.

19.5. The roller bearings utilised on wagon stock have not proved to be the unqualified success that was expected when they were first adopted. About 900 failures are being reported every year while many more fail to give expected service life. Great strides have been made in bearing configuration over the years, and many railways systems do not give any maintenance attention upto a period of 6-7 years. On the other hand in India, as a distress measure, these are being opened up in sick lines in between POH's, under unsatisfactory conditions, for examination and regreasing. The situation has become so serious that a shock pulse tester has been introduced to aid maintenance staff in timely detection of unfit bearings. The roller bearing must give virtually a 100 per cent confidence level in service within its expected life. We recommend that this subject is gone into in depth and suitable designs adopted which do not place any responsibility on maintenance staff outside the workshops.

### III. COACHES

#### 20.0. Introduction.

20.1. There is, perhaps, no aspect that affects the image of the railways more than the service provided to a passenger. About one crore of our people use the Railway services every day and in most respects they find it unsatisfactory. However, no single individual feature of this service can be singled out as requiring the main thrust. The Railways will have to deliver a high quality package, commencing with booking, entry into train, comfortable travel, catering, punctuality, courtesy and finally quick clearance at the terminals. Despite considerable dissatisfaction, the travelling public has been relatively patient in most parts of the country, but this is a situation which may not continue, especially with a tariff structure increasingly aimed at generation of additional resources and removal of passenger subsidies. Generation of additional resources is critical for the long term health of the railways and, we believe that the passenger will pay provided he gets in return a service up to his expectation. The physical condition of passenger coaches and the on board arrangements need a major transformation to achieve these ends.

20.2. The present crisis in passenger movement is convoluted in a vicious circle whose identifiable starting point is shortage of passenger carrying capacity. This has led to overcrowding, over-straining of the existing fleet, reduction in maintenance reserve, prolonging the life of unfit and old coaches, and sub-standard service. A poor ways and means position continues to accentuate the shortage of passenger carrying capacity. The cut-in point, quite obviously is the carrying capacity in tandem with a priority investment plan for maintenance.

20.3. In part I of our Report, we have already brought out that at the beginning of the Sixth Five Year Plan, 2,668 coaches on the BG and MG were overdue replacements with another net 4,494 coaches falling due by the end of the current Plan period. Taking into account the optimum production capacity, the situation would

further deteriorate if some coaches have to be procured on additional account also. It becomes more frightening in the context of projections of passenger traffic by the turn of the century when non-suburban traffic is expected to rise to 320 billion passenger kilometres as against 167 billion at present and 120 billion suburban passenger kilometres as against the present 41 billion.

#### 21.0. Theft and vandalism\*.

21.1. Our observations about theft and vandalism of wagons in paragraph 12.0, are equally applicable for coaching stock. We have seen for ourselves stock coming into workshops stripped of every conceivable fitting, including window shutters, rexine, foam and even complete berths. The workshops are, therefore, being forced not only to perform overhaul and corrosion repairs, but complete refurbishing. The problem appears to be particularly serious in Eastern India.

21.2. While we shall go into security aspects in greater detail in a subsequent Report, we recommend that the Railways consider use of alternative materials which are cheaper and less theft-prone, with priority for areas which are more prone to vandalism.

#### 22.0. Maintenance strategy.

22.1. The basic philosophy behind maintenance of coaches should be over-whelmingly workshop-oriented around mother shops. These should be located as close as possible to the major coaching bases to minimise 'shopping' movements. RITES, in their rationalisation plan referred to in Chapter II, have taken this into account. Our recommendation is that coaches should be taken for periodical over-haul once a year†. In between, base depots should be used, geared primarily towards cleanliness, running safety, and amenity fittings including lights, fans and air-conditioning. Given a high quality of out-turn from the workshops and elimination of arrears of POH\*\*, the open line facilities may be devised on the basis of sickline visits of coaches not exceeding once a month on an average. Even if a coach takes 24 hours to repair in a sick line, this would result in sick lines requiring a holding capacity of only 3.3 per cent of the total coach holdings as against the 4 per cent ‡ prescribed today. The BG coaching sick line capacity would, however, still have to be substantially increased owing to the very heavy shortfalls at present. Table 2.6 of page 52 may be seen in this connection. On the metre gauge, capacity may not need any significant expansion, although the facilities have to be improved as in the case of broad gauge.

#### 23.0. Fresh approaches.

23.1. Some changes in concept should accompany the input into coach maintenance facilities :

1. The present system of attention at all terminals should be critically examined with a view to arranging maintenance, more closely linked with usage. We have examples, within the country, of long distance trains which run for over 2,000 kilometres without attention, and others, which are taken for maintenance at the end of short runs of a few hundred kilometres. This kind of disparity is undesirable both

\* This will be discussed on a Security Problem in another Report.

† Currently the period is one year for Mail, express and higher for other services. RITES had assumed on average of 16 months.

‡ These are expected to be rapidly made up by the commissioning of new workshops at Bhubaneswar, Tirupati and Bhopal.

b See Table 3.10, page 121.



from operational and maintenance viewpoints. On the operational side, this locks up considerable capacity. Rake links\* can be devised for multiple runs by adopting a norm of say 2,000 kilometres, depending upon local conditions. From the view point of maintenance, it is far more effective to give the required lie-over time at specified intervals, rather than piecemeal, and often cursory examination during short halts. This will be particularly relevant for short inter city movements such as Delhi-Agra, Allahabad-Kanpur, etc. In these cases, the full complement of maintenance need not be given at each terminal but only after an adequate distance has been covered by multiple runs. Cleanliness, of course is a major factor. It may not be possible to totally eliminate house keeping attention at the terminals, but full washing may not be necessary for short trips.

2. The issue of cleanliness and hygiene is so important that it would be desirable to bring the medical department more actively into the upkeep of coaches. This is particularly so in ensuring a sterile water supply, especially for drinking water. The medical department should be also involved in periodical disinfection and use of pesticides. Display of certification notices from medical authorities in coaches would go a long way in building up public confidence.
3. Members of the public should be brought more actively into the upkeep and, even design of coaches. The practice of maintaining opinion books for passengers should be introduced and scientific consumer research periodically undertaken as already suggested in Part-II. This may be attempted as an experimental measure first on one set of rakes on each Zonal Railway, where the administration is confident of maintaining the desired standards, and giving quick response to user observations.

#### 24.0. Standardisation studies.

24.1. So far there has been no detailed examination, by any expert Committee, of modernisation, standardisation and scale of facilities required for coaching maintenance in stabling/washing and sick lines. We recommend that such a body be immediately constituted and required to submit its report within a period of four to six months, by undertaking this as a whole time job. Alternatively, this may be given out as a consultancy to an organisation such as RITES which can study developments elsewhere. When the report is received, its implementation should be closely monitored by the Coaching Maintenance Directorate of the Railway Board.†

24.2. It would be useful to associate the consultant in the implementation of the first scheme taken up for modernisation.

#### 25.0. Our recommendations on areas of weakness.

25.1. While the details of the type of the inputs required would have to be worked out, certain broad

areas are given below and these should be useful as a guide :

1. A good arrangement for base depot maintenance, taking due note of the space constraints around coaching terminals, would be provision of a single washing-cum-maintenance line provided with a pit throughout its length. The first portion, running to about three coach lengths should be provided with mechanised washing arrangements for exterior cleaning. On the remaining length, the rake may be stabled and maintained along-with interior cleanliness. External washing would best be done in motion at the time of placement itself. Since the 22-coach rake is being adopted as a norm, and may marginally increase in future, the length of these washing-cum-maintenance lines should be about 30 coach lengths or approximately 675 metres.
2. The maintenance portion of the line has to be suitably designed so that it is possible to undertake all routine repairs inclusive of changing of air-conditioning alternators, if required. The sick line, a separate spur, would be utilised only if bogie or wheel change become necessary.
3. Coach cleanliness should be more correctly defined and developed as a technology with greater use of mechanical scrubbing equipment, vacuum cleaners etc. We have in mind, exterior cleanliness through the use of fixed automatic washing plants with mechanical scrubber and with the use of suitable detergents. It will have to be examined whether this needs to be followed up by a drying process. Under Indian conditions, it will be essential to perform wet cleaning inside coaches periodically, and, therefore, a hot air blower may be necessary in this case. Vacuum cleaners would, of course, be necessary where there is extensive furnishing, especially in the upper class coaches. The cleaning and washing technology should also take into account the desirability of bringing glass windows back to original clarity without damage.
4. Social conditions may necessitate that the stabling lines are made secure by providing boundary walls and manned gates. Escorting of rakes to and from the platform would have to be enforced both for maintenance and to prevent premature and unauthorised occupation.
5. The maintenance lines and the associated work areas will have to be provided with adequate facilities such as electric power and compressed air points, inspection pits and passage for material and equipment trolleys. Apart from the washing equipment, vacuum cleaning, and detergent spray arrangements, separate high pressure water jets for cleaning of air-conditioning condensers are necessary. The pits should accommodate a mobile hydraulic jack to facilitate changing of alternators and drive belts.

\* Cf. Paragraph 13.1.2 Chapter III of Part II of our Report.

† We shall be dealing with the structure of the Railway Board in

a subsequent report. Separation of coaching maintenance Directorate in the Railway Board, if necessary by adjustment, is considered essential by us in view of the heavy responsibility, its peculiar problems and public expectations of better service.



6. The possibility of elevated stabling lines to ensure easy drainage of the pits may be examined alongwith the feasibility of other alternatives such as giving the pits a false screen-type floor through which water may easily pass. For the convenience of cleaning staff, flexible pipes may be provided which can be attached to lavatory chutes for direct discharge into the drainage system without having to first & flush out into the pits where the staff work.
7. For maintenance of the air-conditioning equipment, a variable voltage supply to check contactor operation will help in improving reliability. Suitable test equipment such as digital multi-meters, electronic temperature indicators etc. would go a long way in making the staff more conscious of their responsibilities and ensure greater reliability in service.

#### 26.0. Unit Exchange System.

26.1. Since the availability of coaches is so poor, not only is it essential that the sick lines/maintenance lines handle all routine problems of under-gear, brake fittings and electrical equipment, but also organise themselves to reduce down time to the barest minimum. To this end, the unit exchange system should be adopted at all coach depots, in particular for air-conditioning equipment.

#### 27.0. Availability.

27.1. In spite of an anticipated increase of five percent annum of coaching traffic, the Railways have a general policy of not introducing any new trains in the immediate future. This measure had to be adopted because the production base in this country is, presently, barely adequate to keep up with replacement requirements of overaged coaches. This point is more fully covered in Chapter IV dealing with production on rolling stock. Within this constraint, which is not likely to ease in the immediate future, the Railways must find ways to improve the ratio of available traffic time to total time.

27.2. Table 3.9 brings out the history of coach ineffectives during the past 30 years. Currently, ineffective

example, approximately another 1,300 passenger carrying vehicles and 350 other coaching vehicles could be brought into useful service, provided the ineffective recontrolled to the best levels achieved in the past.

27.3. The position is particularly bad in the case of air conditioned coaches, especially the popular 2-tier A.C. type, on which the ineffective levels are running in excess of thirty percent. This is something no system can afford, least of all a Railway so hard pressed on passenger carrying capacity. The excess time in workshop has already been highlighted in Chapter II.

27.4. Within a short-term, it may not be possible to bring the figures down substantially owing to the incidence of corrosion repairs and absence of suitable layouts and unit-exchange assemblies, especially spare bogies. Nonetheless, concerted efforts have to be made in this direction for whatever gains are possible, since even one percent saving in down-time can contribute significantly to capacity in terms of passenger journeys.

27.5. The system of repairs of air-conditioned coaches in particular, needs critical examination since these are taking more than two months for POH at present. There is also considerable scope in reducing transit time.

#### 28.0. Movement of Coaches between Workshops and Coaching Bases.

28.1. Every effort must be made to reduce the slack in movement between workshops and coaching bases, and in placement and withdrawal from sick lines. We have already recommended an integrated approach to coaching maintenance. Departmental divisions have been stretched to avoidable waste of time by not only having separate managements for mechanical and electrical work, but even separate sick lines.\*

28.2. In busy coaching yards, shunting movements impose a heavy strain on terminal capacity. Successive placements and withdrawals can lead to down time of several days for what is intrinsically only a few hours work. Unifying maintenance would not only remedy this, but prevent the common occurrence of electrical staff disturbing mechanical fittings and vice-versa, necessitating duplication of work.

28.3. As far as the workshop movements are concerned, the movement to and for, as well as awaiting placement inside the workshop, is targeted at 2.5 per cent out of the total permissible ineffectives of 14 per cent. Table 3.10 gives the break-up.

Table 3.9

#### Ineffective Percentage of Coaches

Year	Coaches		Year	Coaches	
	BG	MG		BG	MG
1950-51	14.17	7.64	1974-75	15.98	12.86
1954-55	11.02	7.78	1977-78	13.41	10.00
1958-59	8.59	8.59	1978-79	13.44	10.50
1962-63	7.68	7.78	1979-80	13.90	11.52
1966-67	8.42	6.28	1980-81	14.46	12.75
1970-71	14.30	11.70	1981-82*	16.13	12.37

tives are running at over 16 percent as against the target of 14 percent, and levels of about 8.5 percent achieved in the Second and Third Five Year Plans. In physical terms, this means that on the broad gauge, by way of

Table 3.10

#### Ineffective Percentage Permissible

In Workshops	...	7.5%
Waiting for Workshops	...	2.5%
Sicklines/Depots	...	4.0%
Total	...	14.0%

In practice, this figure is estimated to be more than twice the prescribed percentage. The excess time is, to a large measure, on account of piecemeal gathering of coaches as and when they fall due, and then working

\* Figures provisional.

\* This has already been highlighted in Chapter II, Part I of car Report.



of convenient size rakes into the workshops. Again, when POH is complete, these coaches have to be distributed back to the original base depots.

28.4. The inherent inefficiency of the system is obvious. The Railways must increasingly switch over, to the concept of nominated rakes moving in complete sets to the workshops, and back, and thus perpetuating common due dates. This would also give workshops the benefit of giving economical attention to liveried coaches (those of special colour schemes) as well as those with unique furnishing arrangements. For this a very high degree of management control will be required, since groups of rakes will have to be devised into annual workshop links to prevent non-availability and bunching. The concept has the potential, however, for substantial improvement in availability.

#### 29.0. Coaching Workshop Capacity.

29.1. The requirements for the concept in paragraph 28.4 would, incidentally, determine the logical levels of coaching workshop capacity in the scheme of rationalisation. If the standard rake composition of the future is put at twenty-two coaches, perhaps the optimum capacity of a coaching workshop would be based on a 24-25 coach feed.

29.2. We note that RITES have recommended a standard size of about 400 units on the Broad Gauge and 265 on the Metre Gauge. The RITE'S plan is based on a similar objective of minimising shopping movement and has approached the problem by having a larger number of workshops with reduced lead. This is certainly an important factor, but we feel that the rake-in, rake-out system should have over-riding priority. We recommend that for conventional coaches a capacity 25 units per day (12.5 coaches) and for EMU's 12 units (6 coaches) should be adopted as a guideline for workshop capacity. On this basis, although we have projected BG coach holdings higher than the estimates by the Railway Board and a higher frequency of POH (12 months as against an average of 16 months assumed by RITES), we feel that the ten coach POH workshops would suffice. On the MG, however, there is scope for reduction. Theoretically for EMU's, four such shops would be sufficient, one for each region. Taking into account, however, the large holding in the Bombay area, two shops for the western region may be inescapable. On the other hand, the shop for the northern region may be smaller than the standard size. The position is summarised in Table 3.11.

Table 3.11

Profile of coaching POH shops by 2000 A.D.

Type of stock	Stock estimated by Railway Board	No. of POH workshops	Stock estimated by Committee	No. of POH workshops recommended by the Committee
BG Coaches	35,720	10	37,060	10
MG Coaches	14,705	7	14,625	4
EMU's	6,964	5	8,325	5

Note.—All stock to be given POH once in twelve months.

#### 30.0. Aids to maintenance.

30.1. Many minor irritations to a passenger, which generally give an exaggerated impression of callousness

and inefficiency, arise out of disturbance to amenity fittings. Even when they are intact, the location has frequently been altered, non-standard fasteners used, or the colour scheme ignored. Often, the item is entirely missing or damaged, even if the rake is deployed on a section not prone to vandalism and theft. To overcome this, configuration diagrams for the standard types of coaches must be printed in sufficient quantity and made available to maintenance staff in much the same way that circuit diagrams are given to electricians and wiremen. They should carry information not merely regarding location, but also details of type and fastening arrangement.

30.2. On the electrical side, physical diagrams should be provided to supplement circuit schematics. Supply of these should be the responsibility of the manufacturer. For upper class coaches, to start with, these may be kept in the form of an individual history folder which is issued by the POH workshops/manufacturer and returned for a fresh issue at the end of each POH. The POH workshop should maintain individual history cards regarding corrosion, wiring, piping etc.

30.3. We recommend that Coach Attendants should maintain log books and make round trip reports, *inter-alia*, on ride quality. Efforts should also be made to develop peak acceleration recorders for fitment on coaches of the prestigious higher speed trains, on which ride discomfort can be acute. Although track is periodically checked by recording cars, this does not help in establishing sub-standard performance of any individual coach suspension or wheel profile irregularity. This may be attempted, at first, on high speed inter city trains.

#### 31.0. Coach Attendants.

31.1. The role of the coach attendants should be recognised as a major public relations interface. On this issue, the Railways have over compartmentalised the organisation. While the attendant has primarily commercial functions : unless he is able to attend to minor maintenance work, especially amenity fittings on the run, a proper standard of service will never be achieved. The attendant should, therefore, be given multi-disciplined maintenance training and should carry simple tools that will enable him to attend to minor defects in doors, windows, electrical fittings, plumbing etc. The attendants should make joint checks with maintenance staff when taking over and handing over coaches. The round-trip report suggested in paragraph 30.3 should contain mention of defects and deficiencies. The practice of sending maintenance staff to accompany mail and express trains would become unnecessary and should be dispensed with.

#### 32.0. Fire Extinguishers.

32.1. In 1980-81, there were 29 cases of fire on running trains, classified as accidents, and another 31 stated as "Other Fires" as per the Ministry of Railway publication 'Review of Accidents on Indian Government Railways'. From the safety point of view, it is essential that not only are all coaches provided with fire extinguishers, but each coach attendant trained to use them. This is really a fairly obvious requirement, but the Committee found during their visits that no coach attendants could recall having received any instructions on the subject.

32.2. At present the responsibility for fire extinguisher rests with a wing of the Railway Protection Force. This is an unworkable system, and each coaching base must be able to manage the periodical weighing of gas cartridges, checking of dry powder, and



other specified checks to ensure that the extinguishers will give the desired output. It must be the responsibility of these depots to certify date of last check and the next due date which should be stencilled on the extinguisher itself. Furthermore, each coach attendant must be made to fire at least one extinguisher per year, and, if possible, participate in mock exercises.

32.3. The Railways should also consider the installation of prewarning devices which are now available at a reasonable cost.

### 33.0. Management.

33.1. Divided management responsibility has to be ended.\* The practice of having different sick lines for mechanical and train lighting attention is clearly wasteful and the lack of integrated control leads to a much larger number of coaches remaining out of traffic. Not only would significant economy be achieved, but it would also have a salutary effect on overall maintenance quality and scientific job sequencing.

### 34.0. Organisation.

34.1. A time has come when the maintenance responsibility for freight and passenger traffic has escalated so sharply that there is justification to separate these two, especially on Divisions with heavy traffic of both types. Delhi, Howrah, Kharagpur, Madras and both the Divisions headquarters at Bombay are obvious examples. One or the other of these two types invariably suffers and, given the organisational emphasis on goods traffic, coaching maintenance has been the usual casualty. Separation should be applied selectively, and need not cover small holdings, or individual slip coaches.

### 35.0. Design aspects.

35.1. As in the case of wagons, while the type of coaches have to be identified based on user requirements and consumer research, the Committee would like to make certain observations which are of relevance to maintenance and on board services provided by the maintenance organisation :

1. The Railways have become totally swamped by the corrosion problem which has not only affected availability, but seriously affected workshops capacity and become a safety hazard. The cost to the system in resources, both of funds and man-power has become so enormous that a time has come to seriously consider alternative materials. The possibilities lie in the use of cortan steel, low alloys, stainless steels, aluminium, fibre glass etc. None of the alternatives can be cheap on first costs, and may even necessitate considerable modification to production processes. A detailed cost benefit analysis needs to be made for the various available alternatives, bearing in mind the necessity of meeting passenger demand through high availability. There is also the possibility of using alternative materials in limited areas at the most vulnerable sections, or in varying degree in different areas, if this can be done, without disturbing the basic shall characteristic of coach construction.

The internal configuration of coaches should take into account the habits and requirements of the Indian travelling public. The Railways

have adopted a rather conservative ratio of number of persons per bath room. This used to be 40:1 and although this has been subsequently made 20:1 (reference is to second class coach), this is proving to be inadequate. Similarly water capacity, although recently increased from 318 litres to 455 litres per tank, (total increase of 548 litres per coach) may have to be augmented further. We would recommend provision of one reserve under-slung water tank which the Coach attendant may bring into operation through a stand by hand pump in emergency situations.

3. Vestibuling is of an extremely poor design and there is not much that maintenance staff can do about it. It is unsafe and the riding extremely poor. There are standard international specifications for vestibuling such as the UIC, and the Railways should have no real difficulty in adopting an improved system.
4. Train lighting technology on Indian Railways is out dated, both from convenience and maintenance viewpoints. It is better to have a fewer number of rotamatic fans rather than crowded clusters of a fixed-bracketed design. These can now be developed indigenously without much difficulty. Similarly, the lead acid battery has been discarded by all advanced systems. Although their initial cost is low, their life is short and almost daily checks are required. Much of the battery checking infrastructure can be dispensed with by the adoption of alkaline cells.
5. Not much attention has been paid to on board food and beverage service arrangements. Under Indian conditions, long distance train travel has come to stay. Food is, at present, served most unhygienically. Trays are stored at the ends near the bathrooms, and the bath rooms themselves frequently used for waste disposal, leading to additional work for cleaning and maintenance staff. Apart from what has been suggested by us in Part II (Cf. para 0.15, Chapter III), the design of coaches has also to take into account this requirement. The pantry cars should also provide for seating capacity so that service in coaches is reduced.
6. Although we have recommended a narrowing down of speed differential between freight and passenger trains, the Railways must build up higher speed capability for use in future, or even in the short term in one or two specific case. We had specifically suggested in paragraph 9.3 of Part II of our Report that although speeds of 110 kmph. may continue :

"This, however, should not stop R & D efforts in regard to any specific model section or as part of export endeavours."

Unless better speed capability is built up through internal effort a recurring import of technology will become inescapable from time to time and increase the lead time to adopt higher speed travel whenever it becomes operationally possible.

\* See also Part I of our Report. Para 4.3.4.



### 36.0. Conclusions.

36.1. Phasing out of steam locomotives should be to a well-defined plan which is both numerical and locational and an expert group set up to plan the man-power transition. Alternative use of land and covered areas should take into account the need for additional diesel and locomotive sheds, wagon and repairs points and coaching terminals.

36.2. Locomotive maintenance should be conceived along a multi-pronged strategy consisting of shed repairs, overhaul, special repairs and rebuild. The layout of locomotive sheds should be updated along with detailed studies of individual repair sections. Data processing aids should be provided for maintenance management, parts replacements and scientific statistical appraisal.

36.3. Wagon maintenance should be conceived in

conformity with the requirement of the bulk mode of operation with unbroken end-to-end movement.

All India Train Examining Orders should be drawn up to rationalise the system of examination as recommended by us. Sicklines should be modernised. Workshops capacity made flexible enough to take care of varying types of stock without affecting out-turn.

36.4. Coach maintenance should be basically devised around the workshops, with open line maintenance largely geared to safety checks and amenity fittings. Maintenance arrangements in stabling and washing lines should be modernised after a detailed study by an Expert Group. The time taken for POH of coaches inside the workshops should be rapidly brought down in order to improve availability of stock. Maintenance of coaches should be on unified responsibility. The problem of corrosion should be appropriately tackled.





## CHAPTER IV

### PRODUCTION

#### 1.0. Introduction.

1.1. As early as 1854, the East Indian Railway had built its first passenger carriage at Howrah, owing to misdirection of its first imported consignment. The Howrah Works were shifted shortly thereafter to Jamalpur, which later built 228 steam locomotives and 103 boilers between 1882 and 1923. The same company also built 4 engines at the now defunct Allahabad Work shops. The BB & CI too, built up production capacity and manufactured a total of 405 MG locomotives between 1896 and 1940 in its Ajmer Workshop.

1.2. These early production runs were all undertaken in the steam locomotive overhaul workshops, which by the very nature of maintenance facilities required, were reasonably well placed, to undertake manufacture. Efforts had been made in the 1920's for setting up, specialised facilities for production, and a joint sector venture called the Penninsular Locomotive Company was incorporated in 1921, but never went into production. The reduced demand during the depression of the Thirties appears to have dempened initiative, after which political events and World War II, reshaped the priorities. Wagon manufacture in the non-railway sector has had greater continuity, but here too, it was largely undertaken by general engineering works, and it was not until the boom in the wagon demand during the Fifties that some specialised infrastructure was created.

1.3. Apart from components manufacture, the history of production in the Railways, therefore properly commenced only after Independence, when Chittaranjan Locomotive Works was set up.

#### 2.0. Salient data.

2.1. The Railways have three major production units of their own, specialising in the manufacture of coaches, diesel locomotives, and electric locomotives. A fourth unit for wheel and axle manufacture is in an advanced stage of construction and is expected to go on stream in 1983-84. Table 4.1 gives some salient features of the three units already in production :

Table 4.1  
Salient data of production units

Production Unit	Year Project started	Year Production commenced	Total Capital outlay at the end of 1980-81 (in crores)	Approximate value of production in 1980-81 (in crores)	Total staff employed	Total machinery and plant (in numbers)
@ CLW	1948	1950-51*	65.56	79.69	16,137	3,095
ICF	1952	1955-56	28.19	49.55	14,587	1,044
DLW	1961	1963-64	77.82	94.91	8,075	2,240

@ CLW — Chittaranjan Locomotive Works, Chittaranjan.

ICF — Integral Coach Factory, Perambur, Madras.

DLW — Diesel Locomotive Works, Varanasi.

\* This was for steam locomotives. Electric loco production commenced in 1960-61 and Diesel Shunters in 1967-68.

2.2. The Wheel and Axle Plant now coming up at Yelahanka (Bangalore) is expected to cost approximately Rs. 130 crores with a foreign exchange component of Rs. 45 crores. At the end of 1981-82, Rs. 61.00 crores had already been spent. It is expected to be commissioned in 1983.

2.3. Wagon building capacity is almost entirely in the non-railway sector both public and private, and the marginal wagon construction activity in the railway workshops is being phased out. For coaches too, there is substantial capacity in the non-railway sector. Both manufacturers (M/s. Bharat Earth Movers Ltd. and M/s. Jessops) are public sector units.

2.4. The present annual capacities of these units are given below :

CLW — 66 Electric Locomotives  
50 Hydraulic Shunters/Power Packs.

ICF — 750 coaches

DLW — 140 Locomotives/  
150 Power Packs.

WAP † (Not yet in commission) — 23,000 Axles  
70,000 Wheel Discs.

Wagon Industry — 24,760 four-wheeler units  
(9 units plus Railway workshops)

Coaches (in non-railway sector) — 750‡

#### 3.0. Assessment of requirements.

3.1. The capacities are not adequate to meet future demand which is likely to arise even upto the turn of the century. We have already dealt with capacity requirements for locomotives in Part I of our report dealing with Traction Policy. ‡ Table 4.2 (page 134) brings out the position for coaching stock, wagons, EMUs.

† WAP—Wheel and Axle Plant/Yelahanka.

\*\* See Para 7.0. This level has never been achieved.

‡ See Chapter VII.



Table 4.2

## Production requirements\*

Type of Stock		Holding on 31 March 1982		Projected stock requirement in 2000 A.D.	Estimated number requiring replacement by 2000 A.D. including arrears on 31 March 1982	Total production required between 1982 & 2000 A.D	Average annual production capacity required	Present annual capacity	Additional capacity required
Conventional coaches	BG MG	20,697 13,541	34,233	37,060 14,625	15,155 11,755	44,357	2,164	1,500	1534
				51,685	26,910		3,034		
Electrical multiple units.	BG	2,650		8,325	2,000	10,325	570		
Wagons	BG @	3,03,712 (424,718)		256,740 = (641,850)	263,848	75,400 f.w.units	37,520 f.w.units	24,700** f.w. units	Nil**
Wagons	MG	83,837 = (112,104)		76,870 = (153,740)	73,611				
				333,610	337,459				

\* See Annexure A-4.1. for norms adopted in estimates.

\*\* See comments in para 6.1.

@ Figures in brackets shows wagons in terms of 4 wheeler unit.

3.2. It is obvious that a substantial increase in capacity is required, as brought out in column 8 of Table 4.2, although it may not be necessary in the case of wagons, as discussed later. The actual production capacities may have to be somewhat higher since the additional capacities cannot be created overnight. The Committee wish only to illustrate the quantum jumps necessary. Much will depend on actual materialisation on traffic and efficiency improvements. A brief examination of the production base of each of these four major items of rolling stock is discussed below to evaluate the planning directions.

#### 4.0. Locomotives.

4.1. We have already recommended in Part II of our Report dealing with Traction Policy that electric locomotive production has to be increased to 190 per year by 1991-92. The Railways should now actively plan to set up a second manufacturing facility which should be considered as an integral part of electrification plans.

4.2. We had also recommended that the railways would have to look for capacity for manufacture of lower H.P. diesel shunting locomotive requirements, especially of M.G. shunters and NG from outside the railway sector. This aspect should be followed up vigorously. In the proposed production programme given in Part II of our Report, we had catered for a total of 60 shunters being manufactured by 1990-91, both by supply of power packs from the Railways, as well as complete procurement. Some marginal production was envisaged to commence by 1984-85. Since this proposal is fundamental to our recommendations regarding early discontinuance of steam, a decision has to be taken without undue delay. In case the Ministry of Railways consider that the non-railway sector cannot undertake production to the scales required the Railways should plan to put up their own unit for this purpose.

4.3. Electric locomotive production, however, must definitely be stepped up to 100 by 1985-86 and peak production of 190 by 1991-92.

#### 5.0. Coaches & EMUs.

5.1. Perhaps no other type of rolling stock is in such short supply as the coaching fleet. During the Sixth Plan (1980-85), the need-based replacement of coaches had been assessed at 7,742, which itself would take more than five years based on the production capacity in the country. This leaves no scope for additional services.† It is accepted that the annual growth of passenger demand would vary between 5.0 and 5.5 percent. Thus, the total demand in the Sixth Five Year Plan was estimated at 15,485 coaches inclusive of both additions and replacements, which is more than twice the theoretical production capacity.

5.2. In the capacity reckoning of 1,500 coaches (Cf. table 4.2), we have taken into account that M/s BEMI can supply 400 per year and M/s Jessops 350. In fact Jessops, in the past five years have never supplied more than 65 per year i.e. the capacity utilisation is less than 20 percent. In the case of BEML, the Railway Board has not been able to release orders exceeding 300 per annum, which has led not only to non-procurement of desperately needed coaches but discouraged BEML from making investments for further expansion. The starvation of funds cannot go on indefinitely if the Railways are to provide the nation with adequate passenger transport, especially, commuter services and long distance travel for which there are no other suitable modes. The Railways should adopt a realistic approach and plan a continuous out-turn of 700 coaches per year from ICF, the balance being earmarked for export.‡ BEML have stated that they can expand upto 550 per year, but once again 25 coaches should be earmarked for the export market. Based on the annual requirement of 3,034 coaches over the next eighteen years, this

† Cf. Part II, para 14.0.

‡ See Chapter VI of the present Part.



means that approximately 1,800 coaches and EMUs have to be produced annually from Jessops and other sources.

5.3. It would be desirable for the manufacture of EMUs to be taken up as a specialised activity. We have accordingly assumed that Jessops will in future be required to make only EMUs. The requirements of this type alone would be about 570 per year to take care of both replacement and additional need-based services. Although we have taken into account Jessops' manufacturing capacity of coaches as 350\* per year, the actual production has not exceeded 65 in the past few years, and in 1981-82, it was only 43 in spite of sufficient orders having been placed. The Railways should, therefore, consider the possibility of either setting up one more specialised EMU manufacturing facility or encouraging its development in the non-railway sector. The capacity of the additional plant would have to be fixed after a proper study of the real capability of Jessops and would have to be at least about 220 per year. The uncovered gap for conventional coaches has to be made good by one more coach factory with a capacity of about 1,220 @ coaches per year.

5.4. In the overall scheme of things, therefore, the Committee recommend off-loading of EMU manufacture from ICF, which may then concentrate on a specialised product-mix. The critical factor, however, is how fast the new coach factory and one more EMU manufacturing unit can be put up. The Railways have already planned for one more coach production unit, but this proposal is making very slow progress and delay is adding to public inconvenience. This new unit should receive a high priority. Simultaneously, a plan for augmenting the EMU manufacturing capacity as suggested above should be drawn up.

#### 6.0. Wagons.

6.1. While Table 4.2 (page 134) brings out a shortfall in the wagon production base in the country, this is somewhat deceptive. In the case of wagons, much depends on the selected designs of wagons. The bulk of the orders now being placed are for the BOXN wagons which are provided with cast-steel bogies, thus freeing capacity tied up in bogie fabrication to augment wagon production. Broadly, BOXN wagons, considered equivalent to 2.5 four-wheeler units, may not require any more resources than the conventional four-wheeler units as far as the wagon builders production capacity is concerned. This would result in the existing production capacity being clearly in excess of requirements, leaving considerable scope for export, sophistication in design etc. The Committee, therefore, do not see any reason for seeking increase in wagon manufacturing capacity. There may even be scope for encouraging some of the smaller units, with consistent performance shortfalls, to diversify into other areas.

#### 7.0. Other requirements.

7.1. There is, however a major shortfall in some of the ancillary industries to keep up with wagon manufacture at the projected levels. If an annual production level of even 10,000 (equivalent to 25,000 four-wheeler units) of cast-steel bogie wagons is planned, the steel casting industry would have to supply more than 20,000 bogies annually. As against this, capacity in the

country is reported to be hardly about 3,000 per year. This is a massive shortfall which Railways may find impossible to make good through imports.

7.2. Unless this gap can be quickly narrowed down, it will necessarily result in slowing down of the wagon building programme at a time when a large expansion of goods traffic is slated to take place. It is possible that a number of entrepreneurs in the private sector may be interested, if given substantial orders over a period, and promised continuity of such orders. The Railway should also explore the possibility of utilising steel casting capacity which may be spare in some other public sector units, such as BHEL, Hardwar. As a final surety, however, there appears to be a strong case for the Railways to set up another plant of their own to cover a sizeable portion of the gap. The Committee have taken note of the fact that the Railways have already one captive steel foundry at CLW which is largely being utilised for manufacture of 'CO-CO' bogies required for diesel and electric locomotives as well as traction motors. It is already stretched to its limit and demand will go up further with expanded locomotive production programmes. It would, therefore, prima facie, be a justifiable proposition for the Railways to set up one more steel foundry captive to their own needs. The Committee recommend that this suggestion may be examined on a priority.

#### 8.0. Spring manufacture.

8.1. Although the scale of component requirements on the Railways is so large that a case for in-house production can be made out for many items, especially in the face of the erratic performance of industry, the Committee consider that much can be achieved by policy changes which are discussed in subsequent paragraphs 9; 10. We recommend, however, that the manufacture of springs be considered for centralised manufacture in the railway sector itself.

8.2. The requirements of springs is so large\*\* and the availability and quality of springs so critical to the availability of rolling stock and its safety in operation that the Railways cannot take chances with an erratic supply base. During 1981, twentyfive consequential train accidents have been attributed to spring defects and another thirteen in combination with track irregularities. This situation cannot be left untended. Most workshops on the Indian Railways are constantly in short supply, and even on locomotives, the incidence of spring breakage has been causing concern.

8.3. The quality of springs, is, to a large extent, determined by tightness of control on the initial raw material, followed by an exacting manufacturing proving process. In spite of considerable follow up, the country have not been able to keep up standardisation requirements, uniformity in quality and flow of supplies. The Railways should, therefore, step into this field of activity, which is well within the capability of maintenance workshops. Considerable adhoc production is undertaken in any case. It should not be necessary to set up a completely new production unit for this purpose. The Committee recommend that one or two workshops where production capacity is at present tied up with steam locomotive components manufacture, may be revamped with modern equipment and process controls, and cater to springs to cover the entire railway production and maintenance requirements.

\* See para 6.1, page 13, Part I of our Report.

@ The Committee have assumed that ICF cannot raise production further.

\*\* Given an eight year life, the maintenance requirements for wagons alone would be about 50,000 wagon sets per year, with

each wagon needing a minimum of four springs. On the coaching side, more than 4,000 coach sets are required per year, each set having eight or more springs. The requirement for new production would be another fifty percent for both of these



## 9.0. Organisation.

9.1. Production needs enumerated in the preceding paragraphs cannot be progressed efficiently by routine administrative procedures. The product base has to be extended not merely within the railway sector but to a large extent in the private and public sectors also, where investment decisions cannot always be enforced in conformity with the Railways' priorities. Rolling stock production is a complex process, requiring production of thousands of parts and a competent and well organised sub-contracting system. At the apex, in the Railway Board, there is virtually no institutional arrangement to coordinate the development of a sound production base.

9.2. We recommend that a corporate production plan be drawn up and the existing small Development Cell enlarged into a "Production Directorate" in order to ensure production of appropriate types of rolling stock both within and outside the railway sector, as well as to ensure coordinated capacity for supply of spares for maintenance. If possible, staffing of the Production Directorate should be done by readjustment of posts.

9.3. This Directorate would not only ensure that the nation's existing and projected infrastructure is given the right interface with railway planning for manufacture of rolling stock, but the large and critical requirement of quality spare parts for maintenance are also adequately catered for. The Committee are of the view that in the inability of the industrial infrastructure of the country to adequately meet the railway needs with full quality assurance, a considerable portion of the problem lies in the purchase policy\*, to give only two drawbacks, the Railways seem reluctant to placing firm long term orders on industry and have not shown inclination to help it with advice on how to reach the quality standards.

## 10.0. Purchase management policy.

10.1. To get over the problem of procurement requirements of hundreds of components for which the supply base is erratic, the quality variable, and the difficulty in sifting out bonafide manufacturers from fly-by-night operators, two major changes are necessary. Vendor rating should be put on a scientific footing, and an informal system of ancillary manufactures should be developed in the Railways, purchase management policies. This would entail close coordination with suitable small scale units to establish their basic competence and guaranteed orders for a period of at least three years. Small, but nonetheless critical items for which the supply base may be so developed would cover inter alia, manufacturers of pins, bushes, gaskets, specialised fasteners, rubber parts, locomotive and train lighting bulbs etc. The proposed Production Directorate in the Railway Board should actively pursue this line of approach.

## 11.0 Production Planning.

11.1. Production units have not been getting confirmed orders from the Railway Board in conformity with lead requirements and efficient production management. These units have been put up at high cost and every effort should be made to see that they are given the wherewithal to perform with cost-effectiveness and high capacity utilisations.

11.2. As a test case, the Committee have looked into the production programme of CLW for the year 1982-

83. After an indicative advice from the Railway Board in September 1978, the production programme has been altered on eight subsequent occasions. Two of these were in 1982-83 itself, the last being in September when half the production year was over. During 1981-82, when Chittaranjan should have been finalising detailed plans for the current year, five changes were made. In the course of these changes, electric locomotive production changes have varied between 45 and 70, BG shunters between zero and 18, and N.G. diesels zero and 7 for the same production year. All the changes are not because of the resource environment. Even the resource environment ordinarily cannot justify such changes if orders are based on a firm plan. The number of changes being made in the course of a single financial year is evidence of failure in this direction. The production units, especially the locomotive builders, have stated that the longest-lead items take almost three years between drawing up of tender documents and completion of delivery after final inspection. It is learnt that CLW has been meeting quick fluctuations in production programmes by regulating the supply of materials even after firm contracts, wherever possible, failing which they have had to resort to withholding payments. This is an undesirable practice with available cost to all parties concerned.

11.3. While some marginal adjustments may become inescapable from time to time, it is imperative that :

1. Railway Board ensure that production programmes are drawn up and kept confirmed at least two years ahead ; and
2. It should be borne in mind that many suppliers have production lines totally dedicated to the railways needs, and they cannot be reasonably expected to accept to repeated changes in programmes. This ultimately adds to the cost of the product, and discourages the units from making investments in quality and other product improvements.

## 12.0. Service engineering.

12.1. The responsibility of production units towards users has been inadequately spelt out. There is a misplaced concept that being departmental undertakings largely catering to the Railways own needs, manufacturers do not have to consider service engineering responsibilities in line with accepted commercial practices. The enormous holding of rolling stock on the zonal railways and the availability of comprehensive, decentralised, maintenance system certainly does not necessitate the same service engineering responsible, for these production units as would, for example be necessary for sales to smaller organisations, which cannot build up the same internal expertise or scale of maintenance facilities. Nonetheless, there is a distinct role that is desirable as is evident from the fact that the railways have been insisting upon other major suppliers such as BHEL to organise after sales services. This need is particularly felt in the case of locomotive units. In this context, it is relevant to mention that there are, at present, about 100 DLW-manufactured locomotives and 120 CLW-manufactured locomotives in use in the non-railway sector in India. The services to be provided by the production units may, therefore, be discussed in two separate categories, viz. for the zonal railways and non-railway sector, respectively.

\* We shall be dealing with this in greater detail in a subsequent report.



### 13.0. Railway Sector.

13.1. In spite of consistent claims regarding attention to quality, in practice new locomotives take several days to commission in the base sheds, both on account of the prescribed pre-commissioning checks and servicing, as well as on account of a large number of faults, damages etc. that are unearthed during this exercise. Frequently locomotives have to be stabled for extended periods because of malfunctioning of trial fittings for which no spares are available, especially if modifications have resulted in non-interchangeability with regular inventory. Further more, locomotive failure rates tend to be rather high during the initial few weeks. Although the production units accept a certain measure of responsibility, and, in extreme cases, may send representatives for investigation, there is a general lack of sensitivity and urgency to the problems being faced by the home sheds. It is also understood that the system of warranty claims by zonal railways on the production units has been allowed to go into dis-use through deliberate policy, and is now limited to a few items. Lack of a suitable organisation in the Production Units has further led to a procedure whereby Zonal Railways place their warranty claims directly on vendors, for outside purchase items, leaving DLW/CLW with only a regulatory role.

13.2. In the fitness of things, the pre-commissioning tests, adjustments and calibrations must be done in the presence of the manufacturers representatives. The Committee recommend that taking into account also the needs of the non-railway users discussed in paragraph 14 below, the production units should organise a few suitably placed regional offices with service engineering teams. These should be associated with :

1. Initial commissioning;
2. Inspection of parts that fail much below their expected life ;
3. Technical guidance on maintenance and adjustments, especially where major modifications and design changes have been made ;
4. Stocking of a few spares where the design has changed so that there is no extended down time in case of failure.

These service engineering teams should provide the basic liaison between the zonal railways and the design and spares departments of the production units.

### 14.0. Non-railway sector.

14.1 Apart from the steel plants and Port Trusts, most of the non-railway buyers of locomotives rarely have holdings more than two or three locomotives. For example, CLW has supplied a total of twentyfive locomotives to twelve different fertilizer plants and twentytwo locomotives to nine separate thermal plants. DLW has supplied two locomotives to one State Electricity Board, three to a Port Trust, and six to two separate National Thermal Power Corporation plants at widely spaced locations. Such users are not capable of building up maintenance infrastructure to the required level. In one or two cases, the users have planned to perform all maintenance short of total overhaul, and, therefore, purchased expensive equipment which cannot be effectively used for more than a few days in the whole year. Clearly, on a national consideration, institutional arrangements are necessary for giving the small users adequate support and back up. This will of course, be on payment.

14.2. The best way to do this would be for the regional service engineering cells to carry out the required major preventive and break-down maintenance using the facilities at the nearest railway locomotive shed/workshop on payment. It is appropriate that such arrangements are made with the service engineering cells of the Production Units rather than that this work should be done by the railways who are not a party to the original sales contract. Supervision by service engineering cells would also prevent cannibalisation and other undesirable features which are difficult to control in the existing maintenance ethos of the Railways.

### 15.0. Supply of spares.

15.1. One of the greatest failings in the conceptual planning of production units has been ignoring the inherent responsibility of manufacturers to supply spare parts also. It appears that in an attempt to trim capital costs, the major casualty has been the provision of adequate capacity for manufacturing requisite spares. This has been a very short-sighted policy. The Committee are informed that in an average locomotive shed, at any one time, as much as three to four percent of the fleet remains ineffective on account of shortage of materials. This has caused so much distress that, ultimately, the Railway Board has had to consider putting up a separate plant for manufacture of diesel locomotive components. This will, undoubtedly, ease the position, but problems remain for the CLW output, and, to a lesser extent, ICF (in the latter case, the major demand from the Railways is spare bogies).

15.2. It must be ensured that in future plants or the existing units, when production lines are given major revamping, adequate attention is paid to this requirement.

15.3. Spares are of two types—(a) those manufactured by the production units themselves, and (b) those procured from trade. In the former case, manufacture has been undertaken by the production units, not so much on economic make/buy decisions, but because it was considered that the particular item did not have a secure supply base, both in terms of quantity and quality. These items must necessarily be supplied by the production units to the users upto their full demand. We learn that on a standard diesel-electric locomotive there are about 10,000 different components of which a large percentage is manufactured in DLW itself but only 1106 items have been committed for supply as spares. There will also necessarily be many items where procurement from trade is resorted to for augmenting production in the manufacturers' works.

15.4. Taking note of somewhat tighter controls and inspection facilities with the production units, the production units should take over the responsibility of supplying as spares items which they themselves produce and also procure and supply items which they obtain from trade for their own production wherever the part is highly specialised. It should not be necessary for users to go in for direct decentralised purchases in such cases. This would overcome the reported problem that items rejected by the production units are later being passed on to the zonal railway by exploiting the system's weaknesses. For the non-railway sector, the production units' responsibility should be total.

15.5. With regard to initial spares, the standard practice is for manufacturers to provide such items as, in their assessment, would require replacement in the first two years, after which the buyer places indents based on his personal experience. In the past, the scales



laid down in the Railways appear to have been unrealistic and has resulted in supply of many items which could not be consumed by the railways while other important items were not supplied. The Committee learn that the list of initial spares has been reviewed from time to time but discussions with officers in the field reveals that the system is not yet on a sound footing.

15.6. It is essential that a list is drawn up which should contain a general provision for any item or component on which a design change has been affected and for which, therefore, the railways will take considerable time to put in their standard procurement lists.

#### 16.0. Research and development\*

16.1 Experience over the past thirty years has shown that over-centralisation of research and development in the RDSO has prevented the build up of an innovative approach and hundreds of smaller details have been left unexamined since they do not merit investigation by a major research body. It is in only one case—that of CLW in the early years—where research responsibility devolved upon a manufacturing unit, but even this was hastily revised. The result has been that the production units have not been forward looking and the product of these units has been virtually static in technology.

16.2. The Committee recommend that the production units must be provided with development in infrastructure. Development cells should apply themselves to improvement in component design, layout engineering, experimentation with alternative materials etc. By providing these within the manufacturing unit itself, such organisations would become dynamic and result oriented, and if they work in all earnestness, we are confident that the Railways would see positive benefits and within a short span of time. Such a scheme will help to give the required support to the Central Research Organisation and will also speed up the work of development.

16.3. ICF would, in fact, need two separate wings—one of which should deal with furnishing and ergonomics. This wing should be in lively contact with the consumer research groups†. The scope to improve effectiveness of amenity fittings, layout changes, configuration of lights, fans, water supply arrangements etc. is very considerable and the Railways have not been able to give this matter adequate attention. The process would be a continuous one in conformity with the gradually changing socio-cultural values.

16.4. While interaction between the users and the Production Units would throw up directions for development, some of the areas that we have noted during our visits and which require attention are :

1. Improved instrumentation ;
2. Use of lighter, cheaper and more durable materials ;
3. Interior decor and amenity fittings ;
4. Digital display of equipment performance for locomotive crew ;
5. Attention to ergonomic principles in the layout of equipment both for driving crews in the locomotives and passengers amenity fittings ;

6. Increased use of static components and electronics to improve reliability ;
7. Adoption of better paints and rust prevention systems.

#### 17.0. Value engineering.

17.1. In chapter II we have already touched upon the need for the introduction of Industrial engineering in the workshops. This is equally applicable, if not more so, in these large production units which perform repetitive and standardised activities. In addition, the production units must go in for Value Engineering as an identified discipline in order to lower costs. Special training would be necessary for this. This would have vast applications in manufacturing activity where minor design changes can considerably simplify manufacturing processes without reducing performance, or an expensive material can be substituted by an equally effective cheaper one. Near total absence of materials such as fibreglass is an indication that the scope for value engineering application is very large.

#### 18.0. Management information system.

18.1. In order to improve scientific and cost effective of production management, the necessity of evolving a comprehensive Management Information System for the production units has been felt for a long time. The Railway Board had appointed a special Task Force to go into the question. The Group has recommended a real-time on-line computer system to cover production control, inventory management and budgetary systems, with a standardised configuration for all the three existing production units.

18.2. The proposal envisages two-stage implementation, with the provision of core requirements from the very beginning along with installation of two-thirds of the on-line storage and one-third of terminal facilities in the first phase. In the second phase, the balance requirements would be added. The report submitted to the Railway Board had envisaged that tenders would be called for latest by June, 1978 ; the existing out-dated IBM-1401 system had to be surrendered by October 1980 and the whole process completed by June, 1981. The implementation of the proposed system should be speeded up.

18.3. The Committee appreciates that, notwithstanding existing computer knowledge and experience, real time systems are a new field for the Railways, and it would be improper to hasten large-scale investments without reasonable surety of adequate returns. It would be difficult, however, to perfect a plan without some experience of the latest technologies. Some mistakes are, therefore, inevitable in the initial stages. The Ministry of Railways should not be unduly conservative and speed up installation in at least one unit such as ICF or DLW, which is unlikely to see much change in product-mix in the coming years.

18.4. The subject is extremely important for efficient performance for the Indian Railways, and the Committee, therefore, propose to submit to the Government a comprehensive Report on railroad electronics and information systems.

#### 19.0. Conclusions.

19.1. Additional capacity has to be created for manufacture of electric locomotives, diesel shunters,

\* We will be making a full report on this subject later.

† See paragraph 15.1 of Part II of our Report.



conventional coaches and EMUs. A second electric locomotive manufacturing plant will thus be necessary. Manufacture of EMUs should be a specialised activity and should be entirely taken up between Jessops and a new exclusive manufacturing unit. One additional conventional coach factory should be put up urgently.

19.2. To support the additional capacity for manufacture of rolling stock, the Railways should set up one steel casting unit and also undertake centralised manufacture of springs in one of the existing Railway workshops.

19.3. A Production Directorate in the Railway Board should not only monitor the planning and development of a larger number of production units but also co-ordinate the development of spares essential for maintenance. The production units themselves must develop sufficient capacity for supply of spares.

19.4. The production units should set up service engineering cells both for the Railway and non-Railway sectors.

19.5. Some research and development as recommended should be decentralised to the production units.

*Annexure A-4.1*  
(Cf. Table 4.2)

**Rolling stock estimates for 2000 A.D. norms  
adopted by us**

#### B.G. Coaches.

1.1. Certain assumptions have been made by us, as follows :

1. Vehicle Kms. per vehicle day which stood at 314 in 1980-81 and targeted at 345 for the Sixth Plan, is assumed to go up to 400 by the turn of the century. With increasing emphasis on mail/express and inter-city trains along with maintenance based on usage, we feel there would be no difficulty in achieving such a figure.

2. The composition is assumed to be fifty per cent of 22-coach and fifty per cent of 16-coach trains, carrying 18 and 13 passenger carrying vehicles, respectively, (Cf. para 14.9, Part II of our Report).

3. Capacity of each type of coach has been assumed as follows :

Type of Coach	As per present design	In future
1. 1st A.C.C.	15	15
2. A.C. Chair Car	70	63
3. A.C. 2-tier	46	40
4. 2nd Sleeper	72	64
5. 2nd Day-Seater	90	81

The reduction of capacities is in line with our recommendations to make travel more comfortable. (Cf. para 15.3, Part II) by more amenities and space per person. We have, therefore, assumed some reduction of passenger capacity per coach other than 1st A.C.C. which is maintained as at present, 90% occupancy is taken for estimation purposes, even though overcrowding is manifest in most of the trunk routes.

2. On the basis of the above and train composition as per Para 14.9, page 133 Part II,

Passenger Kms. per  
Vehicle Km.  $\times$

= 25.2 (22-coaches mail & express trains)  
and 35.1 (16-coach short distance intercity trains).

Total traffic demand =  $254 \times 10^9$  PKMs. for BG (Although we had projected  $224 \times 10^9$  PKM total in Pt. II, this excluded  $40 \times 10^9$  Suburban like traffic, which we suggest be catered for by EMU or EMU-like services. We have, however, considered it prudent to plan for only  $10 \times 10^9$  PKM to actually materialise around Delhi, so as to ensure that there is no under-provision of conventional coaches, in case EMU services are not extended to smaller cities within this time frame. Accordingly the total non-suburban passenger kilometrage to be catered for is  $310 \times 10^9$  PKM with a break up of  $254 \times 10^9$  on BG and  $56 \times 10^9$  on MG.)

#### B.G. Coaches.

∴ Total PCVs required

$$= \frac{127 \times 10^9}{400 \times 365 \times 25.2} + \frac{127 \times 10^9}{400 \times 365 \times 35}$$

= 59,300 vehicles.

Adding 25% for OCVs, the total requirement will be 74,125 vehicles = 37,060 coaches.

#### M.G. Coaches

The assumptions made on BG have resulted in a net productivity improvement of 14 per cent in the number of passenger kilometres per coach, by the year 2000 A.D.

On the MG, we expect a further 10 per cent increase on account of overall modernisation. Hence, total improvement has been taken as 24 per cent.

Total traffic to be handled by 2000 A.D.  
=  $56 \times 10^9$  PKM Pt. II)

In 1980-81, it was  
=  $41 \times 10^9$  with 13,728 coaches.

∴ Coach requirement in 2000 A.D.  
 $\frac{13,728 \times 56 \times 10^9}{1.24 \times 41 \times 10^9}$   
= 14,625

#### EMUs.

Total traffic to be handled by 2000 A.D.  
=  $130 \times 10^9$

In 1980-81, it was  
=  $41 \times 10^9$

Holding in 1980-81  
= 2,650

∴ EMU requirement in 2000 A.D.  
 $\frac{130 \times 10^9 \times 26.50}{41 \times 10^9}$   
= 8400

\* This is notional term we have used for convenience. It is really the weighted average passenger capacity per coach reduced by

10% to conform to 90% occupancy.



**B.G. Wagons.**

1. In accordance with our recommendations in Pt. II, we expect traffic to be—

85% bulk full-rake type  
15% in wagon loads.

2. The turn-rounds for these are separately assumed as—

8 days—bulk type  
14 days—wagon loads.

3. Total traffic to be handled  
=  $337.5 \times 10^6$  NTKM (Cf. Pt. II,

$$\therefore \text{Bulk} = 0.85 \times 337.5 \times 10^6 \\ = 286.87 \times 10^6 \text{ NTKM}$$

$$\text{and piece meal} \\ = 0.15 \times 337.5 \times 10^6 \\ = 50.63 \times 10^6 \text{ NTKM}$$

4. The average carrying capacity is assumed to be 52.5 tonnes.\*

5. Average lead 635 Km.

6. The bulk carrying wagon will, therefore, handle.

$$= \frac{52.5 \times 635}{8} = 4167 @ \text{ NTKM per wagon.}$$

and the piece meal wagon—

$$\frac{52.5 \times 635 @}{14} = 2381 @ \text{ NTKM per wagon}$$

Hence requirement of wagons for bulk traffic

$$= \frac{286.87 \times 10^6}{4167 \times 365} = 188,610 \\ \text{and } 196,160 \text{ after provision for ineffectives.}$$

Requirement for piece meal

$$= \frac{50.63 \times 10^6}{2381 \times 365} = 58,260$$

$$= 60,580 \text{ including ineffectives.}$$

Hence total BG wagon requirement

$$= 256,740 = 641,850 \text{ in four wheeler units.}$$

**M.G. Wagons.**

1. Turn-round to improve from 14.2 in 1980-82 to 11 days in 2000 A.D.

2. Hence NTKM per wagon day in use (in terms of four wheeler units) to improve from 538 in 1981-82 to 695.

Hence requirement of wagons in four wheeler units.

$$= \frac{37.5 \times 10^6}{365 \times 695} = 147,826 \text{ bare}$$

$$\text{and } = 153,740 \text{ including ineffectives.}$$

No. of wagons

$$= \frac{153,740}{2} = 76,870$$



\* The fleet is assumed to be entirely of bogie wagons Cf. para 17.11 Part II. The presence of a limited number of four-wheeler wagons will not have much effect on the overall requirement in terms of four-wheeler units.

@ We have reckoned one wagon as one unit. In terms of four wheeler units these would be 1667 NTKM and 1190 respectively for the two types of traffic. This compares with an overall figure of 1112 achieved in 1981-82.



## CHAPTER V

### QUALITY ASSURANCE

#### 1.0. Quality Assurance and Inspection.

1.1. In discussions on quality systems on the Railways, we have been coming up against a somewhat resigned attitude from workshop managements, who universally acknowledge that the quality environment is poor. In the production units while there is a more noticeable sense of pride on attention paid to quality, this seems to draw sustenance largely from relatively better equipment. Even in these units comprehensive quality assurance schemes have not been given the priority that a competitive climate or desire for high standards would have necessitated. In the maintenance workshops, however, there is not even a pretence for such standards. During our visits, workshop-in-charges, have explained that while pressure can be applied in one or two selected areas, the Incentive Bonus Scheme works against effective controls and frustrates the will for excellence. Supervisors, when spoken to also universally said that the quality of bought out items is definitely bad and is a source of corrupt practices. There is no worthwhile user inspection of the work, and that of the production is often sub-standards.

1.2. Since, by all counts, the incentive scheme has put the workshop production managements into a straight jacket against all forms of systems improvement, it is the first to be given consideration in this chapter.

#### 2.0. Workshop Incentive Bonus Scheme.

2.1. The Workshop Incentive Bonus Scheme was introduced in the Fifties, in line with the orthodox management thinking of those years. The concept of 'Payment by Results', after guaranteeing a minimum wage, had already been widely adopted in western countries, with good results. To make the scheme easy to administer a simple formula was adopted whereby each worker receives a bonus payment equal to the time saved while performing a job multiplied by the specified hourly rate for his wage category. To determine these savings, standard timings were first fixed. These have inbuilt cushions, inclusive of fatigue provisions, to ensure that performance at 'standard' rating would itself provide a bonus of 33½ per cent on basic wages. Indirect workers and supervisors are entitled to eighty per cent of the average bonus levels achieved by their associated work groups. A ceiling of fifty per cent in any one month has been imposed to prevent 'overstraining of staff and damage to machinery and plant.

2.2. Commencing with the introduction of the scheme at the Chittaranjan Locomotive Works in 1954, the remaining railway production units and workshops were rapidly covered by crash training of rate fixers and other staff. At present about 99,240 out of a total of 124,550 artisan staff have been covered under the scheme, (millwright and certain other service categories are not eligible) and it has been extended to some civil engineering and S & T workshops also.

2.3. At first, there was undoubtedly a dramatic improvement. A Study Team of the Administrative

Reforms Commission, under the Chairmanship, of Dr. H.N. Kunzru, in its Report of 1968 ; recorded that the scheme had pushed up productivity by fifty two per cent. A further benefit was that, as a part of the mechanics of the scheme, a concept of scientific work measurement was brought into the Railways for the first time. For some period the scheme worked well. A survey of manpower ratios over the past few years, however, indicates that it has ceased to be a motivating factor and in fact, judging by the evidence tendered to us, is positively throttling further effort. The system appears to have bred its own form of conservatism, and malpractices are reported on a wide scale. Table 5.1 gives the position of manpower productivities in four selected workshops over the past five years.

Table 5.1

Manpower ratios\* of selected workshops

Workshop	Year				
	1976-77	1977-78	1978-79	1979-80	1980-81
Parel	0.250	0.226	0.260	0.284	0.250
Jhansi	0.228	0.249	0.273	0.351	0.282
Alambagh	0.193	0.201	0.220	0.263	0.275
Kharagpur	0.236	0.216	0.256	0.269	0.288
All India Average	0.221	0.220	0.236	0.251	0.246

The pattern is similar in the other workshops, with only four out of the twenty major units showing improvement between 1976-77 and 1979-80. While in 1980-81 there has been some reversal of a deteriorating trend, the All India average of 0.246 was twelve per cent higher than in 1977-78.

2.4. During the period that the scheme was being introduced on the Indian Railways, the concept had already started losing ground in its home—the USA—at the behest of both unions and management. A study by Harvard University in 1965 had found that industrial engineering departments experienced difficulty in keeping abreast with changing technologies, and this resulted in looseness creeping into the existing standards. It was also a common experience that on account of grievances, managements were compromising sound engineering principles and timings were being 'sweetened' to avoid bickering and arbitration. The study categorically concluded that productivity is not stimulated by an incentive system, since it is the machine rather than the man, that controls pace, and an incentive scheme is even likely to cause inefficiency. Certainly, it is a breeding ground for grievances that result in souring of even otherwise good labour-management relations. The fact that in USA, even the unions had begun asking for a change in the 1960's is an indication that the bonus scheme, when properly applied, does not hold out promise of easy money. In India, on the other hand, it has become an integral part of wage expectations.

\* Manpower ratio is a measure of productivity and is defined as the number of men required to perform the overhaul of one

unit per-year. For ease of comparison the BG wagon man-hours are taken as one unit.



### 3.0. Present ills. --

3.1. There is altogether too much at stake for the average worker. A recent survey of British Industry made by the Institution of Production Engineers reveal that, wherever the scheme is still applied, the average bonus earnings of direct workers are twentyone per cent indirect workers twelve percent, and administrative workers six to seven percent of basic wage. As against this, the incentive earnings in the Indian Railway workshops in 1980-81 was 40.6 percent of wages and with the Integral Coach Factory as high as 49.8 per cent. These high levels are not on account of any special achievements in production, but, to a large measure, reflect a compulsion of output evaluation in man hours that has to be catered for by any means. Table 5.2 shows incentive earnings of the same workshops whose manpower ratios have been given in table 5.1. The earnings seem to bear little relation to productivity and are remarkably stable. The man-power ratios of Kharagpur, for example, have varied by nearly 30 percent over the past five years while incentive earnings have barely deviated by two per cent.

Table 5.2

**Incentive Earnings of selected workshops as a percentage of basic wages.**

Year	Parel	Jhansi	Alambagh	Kharagpur
1976	42.00	42.41	42.53	41.38
1977	41.15	42.18	43.29	42.76
1978	43.77	41.76	42.97	40.56
1979	44.19	38.24	39.50	42.83
1980	45.14	36.39	34.99	42.49
1981	45.01	41.66	39.57	41.79

3.2. On the one hand, machinery and plant has become increasingly overaged, giving labour a certain rationale for demanding loosening of time standards; and on the other, it has become difficult to eradicate the growing irregularities that have crept in over the years. Short-cut methods are often used and Inspectors tend to pass sub-standard work under pressure. The immediate supervisor has a stake in output at the cost of quality. Extra time is sought, and granted by rate fixers unscientifically, for factors such as excess hardness of work piece, change in batch quantity, machine defects etc. Rate fixing has definitely become earnings oriented, and this is difficult to control because of the extent of personal judgment involved in repair work. Finally, it is learnt that even the basic records are sometimes changed. Management has not been able to keep the situation under control.

### 4.0. Our recommendations.

4.1. The Committee consider that determined efforts to root out the evils from the system cannot succeed significantly, based as they must be, on a comprehensive system of checks and super checks, which may only result in a small number of managers and senior supervisors waging a perpetual battle of wits against their own labour force. The present system must be changed. Since it is obviously not possible to simply abolish a source of earnings, it will have to be replaced by an alternative arrangement that would permit the same level of additional earnings, but also one that inherently

easier to administer, and which yields increased productivity in real terms.

4.2. We recommend that an expert group be set up to go specifically into this question, and, beyond a certain stage, organized labour will have to be consulted and brought in to help iron out details. The Railway Federations are an enlightened lot, and as the proposal is for the common good they should be expected to cooperate in it. From the very start, it must be made clear to all concerned that the new scheme will operate, in its initial form, for a limited period of say ten years after which a review would be made. It is a fundamental principle that productivity linked schemes require comprehensive updating periodically.

4.3. The Committee would like to mention a few suggestions made to us on this subject.

1. Payment should preferably be made on total monthly, upto standard, output and not on the basis of individual jobs. This would considerably reduce the effort involved in maintenance of individual job cadre and punching in and out of idle time etc. The staff that might be saved by changing over to the total output evaluation, as against individual jobs may be more fruitfully redeployed for intensive inspection work.
2. The factor of idle time need not be considered in the scheme at all. Incentive Bonus is given for good performance to the extent that the work is available.
3. Penalties should be applied on an exponential scale, both for quality rejections and attendance, and beyond a certain level, no incentive payment should be paid for the month.
4. Service staff to be brought into the productivity linkage. For example millwright staff may be paid incentive in relation to breakdown repairs.

4.4. We would like to stress that revamping the incentive scheme will be a major pre-condition to quality enforcement, whatever is the system finally adopted.

### 5.0. Inspection arrangements.

5.1. Given the commitment to quality consciousness, suitable equipment, and production control arrangements, there is still a major role for third party (users) inspection. We do not think that we should rely only on internal inspection. We have examined the existing set-up and feel that this needs to be rationalised and modified alongwith a more specific definition of authority of inspection agencies.

5.2. Arising out of the functioning of a large number of Company Railways in India, an Indian Railway Conference Association came into being in 1933 to regulate the movement of stock between individual railways and establish certain norms for financial transactions. An attached office of the IRCA, the so-called Neutral Control, was given the task of examination of rolling stock at interchange points between the railways. Certain defects were declared as rejectable with which wagons could not pass into the adjoining system unless the faults were rectified; others classified as deorbitable, resulted in a financial liability being created on the originating railway on the logic that the receiving organisation would have to make good the irregularities. The system was reasonably effective in its days, with each



railway system having its separate financial base. After the integration, Neutral Control Train Examiners (NTXR's) were posted to supercheck out-turn of major sick lines and workshops.

5.3. The RDSO has historically been providing the Railways with inspection facilities at the production units as well as for the non-railway sector; this inspection is not strict or comprehensive enough at most places. The non-railway sector has, now, increasingly been taken over by RITES, which was set up in 1974. The inspection required for purchase of materials and components from trade was done in the past largely by the Directorate of Inspection (an office of the Directorate General of Supplies and Disposals) and also some by the consignees. Over the years, with more and more material being directly purchased by the Railways (DGS&D's share now is just 24 percent) and the inability of the individual consignees to handle the task effectively, RITES have been given the dominant role.

5.4. We do not find anything wrong with RITES providing inspection for trade-purchased items except that no relaxations should be permitted without reference to users at a sufficiently high level. Some suppliers are reported to be reluctant to accept RITES' inspection which is probably an indication of the tight standards set by them. There are, however, complaints about delays in inspections and, therefore, it must be ensured that RITES is fully geared to the responsibilities placed on it. While the RDSO may continue to provide inspection at the Production Units, their role, as an inspection agency, has to be better defined as discussed later in this Chapter.

5.5 The major issue that we are concerned with, however, is in the workshops, sheds, sick lines etc. NTXR examination at interchange points has been given up, already, as an impediment to the free flow of traffic, and as an unnecessary super check that should more effectively be done in sick lines, originating yards, etc. The system of inter-railway debiting for wagon defects has in any case become out of date. As far as sick lines are concerned, the system is a confused one with a role for the NTXR, but no commitment to office 100 percent of the stock for his inspection. His authority is also rather atrophied. In the workshops, the NTXR does little more than make a symbolic presence felt because he is too ineffective in the hierarchical set up to have his say with workshop officers who are functioning in an out-turn hungry environment. While there is a body of informed opinion that feels that the answer lies in buttressing the NTXR organisation the Committee is of the view that its role is clearly over, and it is a waste of effort in trying to revitalise an organisation that has outlived its old utility.

5.6. As far as third party inspection in the workshops is concerned, we have taken note of the various aspects and concluded that this is best provided by the parties where the shoe pinches the most. The Chief Motive Power Engineers and the Chief Rolling Stock Engineers on the Railways have prime responsibility to ensure that rolling stock is reliable in operation and has a high degree of availability. They are the real users and we recommend, therefore, that they should have captive Inspection Cells composed of experienced staff, permanently posted in the workshops. These Inspectors would have a direct line of communication to senior management levels and it is expected that, with this arrangement, controls will be much tighter. Comprehensive quality assurance programmes should be drawn up for overhaul of locomotives, wagons and coaches to help Inspectors to perform their functions efficiently.

5.7. We do not expect this arrangement to cause much expense in real terms. There will be savings in winding up the NTXR organisation. It would also eliminate the informal practice of sending representatives from the Divisions to the workshops for joint checking, whenever quality problems reach crisis proportions. The real economy lies, however, in improvement in reliability.

5.8. We do not recommend any form of regular third party inspection in the locomotive sheds, sick lines, etc. The locomotive sheds are officer-headed and, unlike the workshops, are already judged by the level of failures in service. Here the levels of tolerance accepted by management is the critical factor. We also expect that with proper modernisation of carriage and wagon maintenance bases, and a reduction in the number of such points, gazetted management will become available at important maintenance centres. This should improve both quality assurance and quality audit. The Inspection Organisation recommended in paragraph 5.6 may, however, be utilised to make frequent checks at the discretion of Heads of Departments. In addition, a few inspection teams should be set up at operational nodal points to monitor the condition of long lead trains. These teams should report to the Director Mechanical, Railway Board.

5.9. While RDSO has been providing Inspectors at the production units, who made tangible contributions in the early years, their present effectiveness leaves much to be desired. This is on account of the tradition built up of over-reliance on internal inspection sheets, as well as on the unfettered authority available to local management to overrule the objections of RDSO Inspectors. On a certain number of critical parameters, the Inspectors must be empowered to establish customer hold-points at the manufacturing stage. At these points, the Inspector may be vested with authority to prevent further progress of assembly unless the fault has been rectified or the component replaced to the satisfaction of the Inspector. The inspection team should also be free to make any spot checks and physical verifications. For internal inspection, relaxations should require the personal clearance of the General Managers in-charge of the Production Units. Wherever relaxations are given, the RDSO's Inspectors should also be consulted and for identified customer hold points, their acceptability should be mandatory. Normally, such relaxations by the RDSO's Inspectors should be limited to non-safety items and static components.

5.10. We understand that many relaxations are accorded in the anxiety to keep up to production schedules. It is better to delay deliveries rather than lower standards. In an extreme case of non-agreement, the proposed Directorate of Production in the Railway Board should be the proper body for final decision. It will be seen, therefore, that the responsibility of the RDSO's Inspectors requires to be far more comprehensive than at present. They should, in fact, be held responsible for defects found later in service.

5.11. As far as internal inspection is concerned, the principles and methods are too well known to need comment. We can only express a hope that management will show the proper concern. The principle should be to have inspection cell directly under general management and not as part of the works hierarchy. While the production units have fairly good inspection facilities, the workshops and sheds should improve the hardware and instrumentation for accurate and quick gauging. There is, generally, a lack of sensitivity in the workshops to many important aspects such as surface



finish, film thicknesses, torque values, areas of contact, and a host of other less obvious factors that affect service life and reliability. Even for physical measurements of small bores, parallelism etc. equipment is not up to the mark. These are matters of detail which have to be examined according to the needs of individual establishments. We wish only to emphasise that inspection can be effective only if it is accurate, quick, strict and covers all important features, which unfortunately is not the case in all respects at present.

## 6.0. Drawing and Specifications.

6.1. An important element in inspection is codification of drawings and specifications. Even for standard locomotives and other rolling stock parts each zonal railway has been maintaining its own drawings and often taking liberties with specifications. There is no harm in experimentation and innovativeness, but the vast bulk of drawings should be the manufacturers originals, and the practice of each zonal railway having its own serial number should be discouraged. This only confuses the inspection agency and is liable to act as a restraint on interchangeability. Furthermore, to ensure that the parts description is kept up to date, manufacturers should issue an annual index of latest drawing numbers for each group of items.

## 7.0. Organisational weaknesses.

7.1. At the apex level in the Railway Board, we have already recommended the setting up of a Coaching Maintenance Directorate in Chapter III and a Production Directorate in Chapter IV. At the zonal level recommendations have been made about strengthening the planning organisation for the purposes of modernisation and the establishment of a running branch for wagon examination. Arising out of our recommendations regarding better attention, to coaching stock, however, the Committee are of the view that the carriage and wagon organisation as a whole needs a fresh look.

7.2. Historically, Carriage and Wagon has been taken as a single function and this is continuing till today although the arrangement has long since lost validity. Freight and passenger transport are identified as the two major functions of the Railways and, therefore, operational management has already been separated upto the level of Head of Department. Maintenance, however, continues to be combined down to the level of senior supervisor. This arrangement ignores the fact that two have widely different technologies, maintenance needs, operational compulsions and extent of public interface. We have already recommended separation of maintenance on those Divisions that cover the major metropolitan cities.\* This should also be considered for other Divisions with large coaching bases such as Lucknow, Secunderabad etc. The maintenance of coaching stock should also be unified under a single line of management.\*\* Unless this is done, the healthy and efficient development of systems needs will remain inhabited.

## 8.0. Workshop organisation.

8.1. It would be observed from Chapter II that the emphasis on rationalisation of the system is on workshop responsibilities being on an All-Railway plan rather than perpetuating unnecessary multiplicity which is a natural corollary of zonal ownership and maintenance of rolling stock.

8.2. If the workshops are not to be limited to zonal stock ownership, it does not appear to be good arrange-

ment for these units to continue functioning under the management of individual zonal administrations. The zones may also increase or decrease in numbers depending upon work load, communication needs, and management practices. RITES had proposed reorganisation of the workshops on a regional basis to overcome this problem.

8.3. We recommend a regional grouping of workshops under a senior executive to report direct to the Railway Board. The staff requirement for this reorganisation can be adequately met by reduction of the existing zonal headquarters workshop organisation, whose function in the new scheme will be limited to liaison. This would relieve the open line General Managers from a fair measure of responsibility and enable them to concentrate on operational aspects for which they are primarily meant. On the other hand, the workshops would receive the necessary technical and close attention and a proper infrastructure can be created for development plans, implementation of technology changes, training and work-load balancing. The country may be divided into four regions along a geographical distribution for this purpose.

8.4. Shri V.P. Sawhney has, however, expressed a different view. He has stated that "Zonal Railways are compact units required to cater for day-to-day rail transportation needs of the various zones. It is very essential that each zone should not only be well supported with open line maintenance facilities but they should have full back up of workshops over which they should have full control. It is inconceivable that an operating zone working efficiently without workshops being a part of its system. Both workshops and the operations are closely interdependent. For running repairs these would need the assistance of workshops and similarly workshops would depend upon the Zonal Railways for feeding and movement of Rolling Stock to and from. For matters like handling labour and law and order problems, security and staff placements the shops would largely depend upon the Zonal Railways. By reorganisation the workshops performance would be divorced from the day-to-day Railway operations and would lead to over centralisation of management instead of decentralisation which is the accepted current trend. Workshops must play a secondary role to Zonal Railways and not get isolated from their control. Our working conditions do not suit overcentralisation of maintenance workshops. To get the best turnout from the workshops these could be nominated and equipped to deal with only specific type of Rolling Stock and for the interzonal distribution the control could continue with the Mechanical Directorate in the Railway Board—if necessary the same could be strengthened.

8.5. Within the individual workshops, we have found that the service facilities have not been organised in the best possible manner. The workshop incharge in these units, many of whom have annual budgets running in excess of Rs. 108 crores, have all mentioned difficulties arising out of lack of authority over their own service organisations. Not only do attached Stores, Accounts, Security and Electrical services directly report to their own departmental seniors, outside the workshops, but there is even no higher control within the workshop for day-to-day minor attention to structures, track, drainage etc. During our visits, we have found traverser tracks which lie at the heart of internal overhaul logistics in poor and even dangerous condition. Ventilators are generally dirty, lighting poor and sanitation sub-standard. The reason appears to be that the

\* See Para 30.0 Chapter III.

\*\* Cf. para 4.3.4 of Volume I of our Report.



specialised staff meant for maintenance of these functions report to divisional authorities who naturally find operating priorities more pressing. We, therefore, recommend that, in line with the practice on the Divisions, all departments serving a workshop are brought under the workshop incharge.

8.6. We have everywhere seen evidence of poor maintenance attention to workshop buildings and the inability of local managements to make quick changes to layouts, or add to marginal balancing facilities. This arises out of a rather generalised budget being established for 'Maintenance' by the Civil Engineering Department. To ensure that such maintenance and minor works implementation is more effective, we suggest that budgets be drawn up on an item-wise basis in consultation with the head of the unit and a proper concept of performance budgeting is brought in.

#### 9.0. Spans of Control.

9.1. We have noted that the Mechanical branch in general, has been given somewhat unrealistic spans of control of both assets and personnel. Although there has been some improvement over the years, in the Divisions and Workshops, the ratio of officers to staff is 1:510 on an average. Nearly 40 per cent of the officer cadre is in the assistant officers grade. Assistant officers may generally be considered as an executive assistant to the departmental incharge, or as trainees. The effective span of control is, therefore, much higher and we find that officers in the mechanical branch are spending a large proportion of their time on staff grievances and personnel aspects, which is not the best utilisation of their technical knowledge.

9.2. There is clearly need to add more punch to the management effort. The process of modernisation itself, especially phasing out of steam, will undoubtedly ease the position, somewhat. Efforts to improve efficiency will, however, remain stunted unless need-based strengthening of management is also undertaken simultaneously.

9.3. We do not recommend that any specific yardstick be adopted, but areas of weaknesses should certainly be identified for giving better management support. We have already discussed many such areas of weaknesses and these are :

1. Industrial engineering
2. Inspection
3. Fuel Management
4. Planning

9.4. The same principle should apply to spans of control of supervisors. Here a yardstick is more clearly necessary. The Committee are informed that in the army base workshops, there is one supervisor for every eight persons and the Foremans control is over 112 men on the average, with one senior Foreman for every three foremen.

#### 10.0. Lateral contacts and experience sharing.

10.1 During our visits to various workshops we have found that workshop officers have had almost no exposure, not only to engineering units outside the railways sector, but even from one railway unit to another. This sense of aloofness is difficult to explain. The country has also come a long way from the early Fifties, when the Railways could legitimately claim to be in the forefront of mechanical engineering technology and there was, therefore, not much to gain for the Railways by sharing experience with units in the public and private sectors. The situation is now somewhat changed.

10.2. While institutional arrangements can be made for technology update, this cannot be a substitute for in-depth expansion of horizons of field level engineers and supervisors. The Railways should, therefore, ensure that there is a regular system of brief educational attachments of workshop officers with units in the public, and, if possible, private sectors, in distinct, carefully planned areas which will be of use in day-to-day working. We emphasise that such visits should not be general tours, but oriented towards specific fields, such as painting, surface preparation, material handling, welding, examples of superior management etc. to search for new methods and ideas. The system should also be followed as between railway workshops and we would normally expect that the workshop in-charge and the Production Engineers are familiar with the working of all other major units in the country.

10.3. Apart from such lateral contacts it would also be useful to arrange annual meetings between workshop in-charges for which a proper agenda may be drawn up to discuss important issues which are of common interest and any other issues raised by individual workshops. Such a system has been working quite successfully for diesel and electric locomotives for many years now.

10.4. It is understood that the system of exchange of ideas and information, wherever it exists, has not been utilised effectively for policy framing. The case of the Diesel Maintenance Group, perhaps, the most organised such forum, is a case in point. Although the Railway Board, the RDSO and the Production Units are fully represented in the annual discussions, the decisions taken do not appear to have any sanctity. It would be advisable for the empowered authorities to formally accept or reject suggestions made, and when accepted, to ensure their proper implementation.

#### 11.0. Man-power Planning and Training.

11.1. In the final reckoning, the man behind the machine is the most critical factor. We have noted that neither recruitment nor training of the 577,500 staff involved in production, maintenance and operation of rolling stock has received the attention that it deserves. To our minds, this is a matter for highest priority without which all other investments may become infructuous.

11.2. The Committee intend dealing with Man-power Planning and Training comprehensively in a subsequent Report since the position is similar in other disciplines of the Railways. At this stage, we merely wish to highlight that during the course of our visits to workshops and other maintenance facilities, we have become convinced that the present man-power base is not equal to the technological challenge of the future.

#### 12.0. Conclusions.

12.1. The system of NTXR examination should be given up and inspection should be undertaken by organizations of the locomotive and Carriage & Wagon Departments at the Railway workshops.

12.2. Proper quality assurance schemes should be drawn up. In the Production units, the authority to give relaxations should be limited to non-safety items and only in consultation with the RDSOs inspecting officials.

12.3. The Workshop Incentive Bonus Scheme should be studied by an expert group in order to formulate a better system more conducive to productivity.

12.4. The Railway workshops should be reorganised along a regional functional pattern.



## CHAPTER VI

### EXPORTS

#### 1.0. Introduction.

1.1. With a good manufacturing base and relative sophistication of technology export of rolling stock equipment should normally have developed into a major constituent of engineering goods export from India. The nation's trade balance and the tremendous potential of foreign exchange earnings are reasons enough for this sector to have been identified as an important area for export promotion. The potential has not been fully realised.

1.2. Commencing from 1967-68, export of railway equipment in fourteen years had cumulatively totalled Rs. 130 crores by 1981-82\*. Of this Rs. 24 crores are account of coach exports, Rs. 15 crores on locomotive sales (including deemed exports) and around Rs. 74 crores on wagons. The balance has been an assortment of items, mostly coach and wagon bogies, rolling stock spares, ticket printing machines etc. Of the total, the production units and workshops of the railways have had a share of only about Rs. 39 crores, the balance being contributed by the public and private sectors. In physical terms, exports upto the end of 1981-82 consisted of approximately 7,350 wagons, 400 coaches, 21@ diesel locomotives and 5 reconditioned steam locomotives, as far as the complete rolling stock is concerned. 257 coaching bogies and around 1,000 wagon bogies are the other major items that have found markets abroad.

3. The annual export of wagons has barely averaged two percent of the country's installed capacity, and this level has been achieved at a time when the percentage utilization of installed capacity has not generally exceeded fifty percent. In fact, the highest annual export of 842 wagons was in 1971-72, before exports had become so critical a national priority. On the coaching side also exports have averaged around two percent of the country's capacity, and the average production level has been about seventyfive percent of installed capacity. In this case also the peak annual exports was achieved as far back as 1971-72 when 113 coaches were supplied to Taiwan. Clearly there is no real thrust in our export endeavours in respect of railway rolling stock. We have examined the reasons and come to the conclusion that the problems are both commercial and technological.

#### 2.0. Export arrangements.

2.1. In the early 1970s, wagon export became canalized through the Projects and Equipment Corporation (a wholly owned subsidiary of the State Trading Corporation) with a view to helping an industry that was rapidly becoming sick due to reduction of Indian Railway orders. Canalisation was a welcome step since it helped to regulate the load and eliminate unhealthy competition. The Railways, lacking commercial flexibility, entered into a protocol with the PEC for the

latter to handle export of all items manufactured by them. This arrangement became formalised in 1977 with the Government of India's export policy stipulating that all items of rolling stock, and their major parts, would henceforth be canalized through the PEC, which has, thus, emerged as virtually the single authorised export agency for railway equipment. In all matters requiring rethinking, therefore, a role will have to be played, both the various manufacturers as well as the PEC. It is learnt that coordination has not always been good and the manufacturing and marketing organisations have sometimes lacked coordination and single-ness of purpose.

#### 3.0. Export policy.

3.1. Little can be said about the existing export policy, other than that, it has not really taken off the ground. Wagon manufacturers have responded to opportunities depending upon the extent of Indian Railway orders and have shown a reluctance to prepare for long-term trends. Nothing brings this out more clearly than the fact, that when the US market suddenly burgeoned in the late Seventies and provided a potential that exceeded the rest of the world's requirements put together, Indian wagon builders completely failed to respond, in the face of the technological and commercial challenges involved, the industry is not inherently uncompetitive, as is brought out by the exports in the past. Similarly, the Railways, until recently, considered each export query in relation to their own requirements and the PEC had no guarantee or commitment from the Railways to export. More recently, a more forward looking view has been taken, and, in theory, the Railways are committed to allocate ten percent of the annual turnover from the ICF for export, but have stipulated that Railways will consider only standard types which generally fit in with Indian Railways' specifications. At no stage, is there any evidence of Government having attempted to assess the percentage share of the international railway equipment market that India can legitimately meet and market for the inputs required to achieve it. A clear policy has to be enunciated that seeks to bring all organisations into a common national objective and high level support in its implementation. Some of the issues involved are discussed in succeeding paragraphs.

#### 4.0. Commercial and pricing.

4.1. Although railway equipment has been receiving cash compensatory support which is quite attractive in relation to other engineering goods, the competitiveness of the Indian product has lost out, because of indigenous steel prices having overtaken the international rates. While the Government would have to consider the overall implications of supplying steel to the railway equipment industry at international prices (thus providing an additional element of subsidy), sufficient

\* This figure excludes any general purpose items and track fasteners that might have been exported in small quantities to railway systems abroad. Such tractions have been handled by a large number of companies and reliable figures are not available.

able. The total value would, however, be marginal.

@ This includes six supplied to IDA-funded projects in India against global tenders. These qualify as export as per Government policy.



thought has also to be given to cutting down on the cost of manufacture. To the extent necessary, over-heads may be reduced on the export product below its proportionate share of overall production.

4.2. Rolling stock is volume-critical for shipping, and for most destinations from India, the cost of ocean freight of wagons can add up to forty and even fifty percent of the final delivery price. The disadvantage to the Indian product in the vast West African market from European manufacturers and South East Asian markets from Korea is substantial, especially, with many other countries having adopted a policy of subsidising freight. This point will have to be looked into in depth, if India's market is not to be confined largely to immediate neighbouring countries, which have limited demand.

4.3. One important factor for the relative decline in the quantum of export over the years has been that India is now competing increasingly in international markets, and can no longer rely on bilateral deals which accounted for much of the success of railway equipment exports in the early years. It has become an established practice that the bulk of railway equipment entering the international market is accompanied by very soft credits, which India, naturally finds hard to match. We are not in a position to make specific recommendations on this in view of the many ramifications which lie outside our purview, but would only suggest that, in specific cases, some flexibility would go a long way in maintaining continuity in markets which have long term interest for us.

4.4. To firm up the strength of the export base a deliberate policy of latering production mix may be considered. For example, Bharat Earth Movers Ltd. may be given part of the annual orders for metre gauge coaches instead of limiting this only to I.C.F. This will enable this second coaching unit to be in readiness to handle export queries especially when I.C.F. is heavily committed to the domestic market. This would also help in keeping up production even when plan funds for the Railways are insufficient to keep the unit busy.

4.5. There is an extremely large demand for Diesel Rail Car Sets in many South East Asian, African and Latin American countries. These are being increasingly adopted in non-electrified sections to carry high passenger loads over relatively short distances. Having both a good coach and diesel engine manufacturing base, it would be advantageous to tap this market by developing suitable designs, even if in the immediate future, their utilisation on the Indian Railway system does not have priority.

## 5.0. Design of rolling stock.

5.1. Owing to the generally static specifications that have been followed by the Indian Railways over the years, railway equipment from India can no longer claim to be technologically as competitive as it was even ten years ago. It is not often realised that even developing countries now are intolerant of anything but the very latest in equipment, and the concept of an appropriate intermediate technology is largely wishful thinking. Government of India in its export policy, already provide for very liberal imports to meet export requirements. It is the manufacturing industry that has been altogether too conservative in making use of these concessions. This is of particular relevance in units, such as the ICF

and DLW, both of which are departmentally controlled undertakings. In the process, they have failed to make use of the opportunity to buy sub-systems and their designs which could have been done from their own export earnings, and given a double benefit to the nation by way also of improvement of the domestic product. The Ministry of Railways should take up with the Government, the desirability of its departmental undertakings being permitted to retain a percentage of their export earnings to buy design from abroad, and finance new collaborations, if required, on a case to case basis.

## 6.0 Coaches.

6.1. On coaches, the biggest casualty of a policy that limits exports to standard products, is the fall in relative speed capability. While on the Indian Railways there is at present no urge to increase passenger speeds, this is not true of the situation abroad. A general speed capability of 160 kmph. on the Standard Gauge, and 130 kmph. on Metre and 1067 mm. Gauges, is the minimum that will have to be achieved if coach exports are to survive. Buyers like to be assured, however, that these are proven designs and not just theoretical figures. To this end, it is essential that the ICF (perhaps the single largest coach manufacturing unit in the world) is provided with a test track of adequate quality. RDSO would need such a facility for its long-term R & D in any case. In the absence of matching indigenous locomotives, import of one or two could be made.

6.2. Coach designs will generally have to take into account the fact that the largest potential for export is to prospective buyers who prefer U.I.C. and A.A.R. specifications.\* IS or IRS standards are not freely marketable in a competitive environment, even though they are not necessarily inferior in all respects. Thus the ten per cent production allocation for exports cannot be realised unless customer preferences are adopted. Furthermore, not only will quality of finish, fittings, paint etc. have to be improved, capability for use of a higher generation of body materials, such as stainless steel and aluminium must be developed, even if a less ambitious alternative is adopted for internal use. Specific attention has to be paid to improvement of vestibules, train lighting and airconditioning with individual compartment control.

6.3. We have already recommended a specialised plant for manufacture of EMUs. Rapid transit schemes for intra-city travel is the fastest rail growth area in the world and the opportunity should be availed of to incorporate technologies and designs that are desired abroad. EMU exports should be looked upon as a major new product area while planning the capacity and equipment of the new factory. The Committee are of the view that EMUs and high-speed coaches should provide the bulwork of India's export endeavours in railway hardware.

## 7.0. Wagons.

7.1. The technology gaps here are not so formidable. It is lack of appropriate materials. Copper bearing and corten steels have to be made available. Steel casting capacity for bogie manufacture, however, has to be increased and the number of bogie designs themselves diversified to meet various preferences.

## 8.0. Locomotives.

8.1. Opportunity lies mostly in diesel locomotive export, but some technology changes will be necessary

\* The bulk of the Middle east and North African countries have adopted UIC specifications, in line with European practice. Latin America follows the US with A.A.R. Indian Specifica-

tions have largely been acceptable only in the Common wealth. Competing nations, such as S. Korea, Japan, Romania and the UK do not limit their export product to any one set of standa



The single most important input would be manufacture of MG locomotives of about 1550 H.P. which is possible by upgrating the existing 6-cylinder engines or upto 1800 H.P. by adopting the 12-cylinder design. Neither of these two requirements would impose any problem on the manufacturing base, and it is in line thinking on the Indian Railways itself for MG locomotive power. There is doubt about the present BHEL manufactured electrical equipment. In the immediate future, therefore, the attempt has to be to ensure that the product remains competitive with imported electrics.

8.2. While efforts have to continue to achieve greater fuel efficiency, and to improve the design of some components the accent has to be essentially on very tight quality control.

#### 9.0. Other important issues.

9.1. Keeping in view the extent of railway equipment entering the international market every year, the immediate targets should be set at increasing annual export of rolling stock by at least 300-400 per cent. With a quickened pace of railway development in many parts of the world, however, export opportunities do not come up by themselves. The Indian infrastructure is sufficient for a major thrust being made in total project exports, even on a turn-key basis. An Indian Railway Construction Company (IRCON) for construction of track and structures, and RITES for consultancy already exist. These two organisations can profitably join hands with the equipment export house and enter the international railway project markets as a consortium. Many buyers abroad with lack of infrastructure in their own countries would prefer a total service. This would also help in off-setting the cost of certain uncompetitive items by the lower cost of the total package. While there has been some thinking on this, lack of coherent and co-ordinate policies have prevented a meaningful dialogue between the different corporations towards this end.

9.2. Opportunities are knocking at our doors, waiting to be exploited. If the production cost estimates of the Wheel and Axle Plant materialises, the cost of a wagon would reduce by about Rs. 20,000/-

as compared to one now being offered with imported wheel sets. This is the right time, therefore, for Government to take a comprehensive look at the problem and bring all sectors involved with railway exports into a formulation of common objectives and regulate their inter-se responsibilities.

9.3. Railway hardware, locomotives, coaches, EMUs, car sets and wagons, should be used as one of the principal levers for boosting exports from the engineering sector. Both the production projects and manufacturing orders of the Government should reckon with a bold export thrust, properly quantified in terms of specific numbers of items that the country must programme to export, during each Five-Year Plan. And this must be treated as sacrosanct, and not be whittled down for adhoc local requirements, the latter being independently planned for and produced for the Indian Railways and industries.

#### 10.0. Conclusions.

10.1. We feel that the tremendous potential for boosting up Indian exports in railway hardware in the shape of locomotives, coaches, EMUs, car sets and wagons, has been very inadequately exploited, and that this situation needs to be urgently and substantially remedied.

10.2. A properly co-ordinated strategy for export of railway hardware needs to be developed urgently.

10.3. In the interest of competitiveness in the world market, India has to keep abreast of the improvements in technology in railway hardware. Even where this may not be fully necessary for indigenous usage, this should be achieved for export markets and even in relation to materials, speed capability and designs.

10.4. Wherever necessary, RITES, IRCON and PEC should come together with a consortium approach.

10.5. A proper quantification of the export possibilities in railway hardware should be worked out for each Five Year Plan, and their fructification pursued from year to year.



## CHAPTER VII

### SUMMARY OF RECOMMENDATIONS

#### Chapter I

##### Overview

1. There is marked correlation between the position regarding ineffectives and the percentage of rolling stock overdue POH. POH capacity has fallen far short of requirements and must be built up urgently.

(Paras 3.2 and 3.6)

2. Suitable institutional arrangements should be set up to evaluate efficiency of production and maintenance operations.

(Para 3.9)

3. A Technology plan is necessary to keep maintenance and production facilities up-to-date and cost-effective.

(Para 3.10)

4. A proper balance should be maintained between the quantum of work done in the workshops and open line facilities. This balance has been seriously disturbed in the past two decades.

(Para 3.12)

5. The human resource base should be given priority, as the Railways are facing a serious problem on account of recruitment of unqualified hands without matching emphasis on training.

(Para 4.1)

#### Chapter II

##### Workshops

6. Maintenance of wagons and coaches should be basically workshop-oriented.

(Para 1.2)

7. Before any inputs can be considered for workshops, a rationalisation programme should be finalised.

(Para 2.1)

8. The desirability of working on the basis of full unbroken rakes should determine the minimum capacity in each workshop.

(Para 3.1)

9. In planning for workload, rationalisation on a systems basis should be given the first priority to ensure that investments yield the fullest return.

(Para 5.2)

10. The approach of RITES to rationalisation is supported, but caution is necessary against future planning based on continuance of steam locomotives, beyond 2000 AD, and in certain other matters of detail.

(Para 8.2)

11. It is not correct to evaluate wagon POH load in terms of four-wheeler units. The number of man-

hours required to overhaul a typical bogie wagon (BOX type) is actually less than a four-wheeler, age for age.

(Para 8.3)

12. Wagon production in the Railways should be limited to the manufacture of prototypes. Surplus capacity from steam locomotives may be utilised for maintenance of other types of equipment, such as cranes, track machinery, bridge structurals etc.

(Para 8.4)

13. Improved production control and management information systems should be taken into account in fixing standard workshop capacity.

(Para 9.1)

14. Rationalisation should take into account not only future types of stock, but also technologies and material handling equipment. Some types of existing capacity like heavy forging may become totally redundant.

(Paras 10.1 and 11.1)

15. Broad make/buy decisions should be taken in advance as a part of rationalisation.

(Para 13.1)

16. Railway Board should immediately apply itself to the preparation of a properly integrated rationalisation scheme and communicate it to all the workshop managements to prevent adhocism and disjointed management decisions.

(Para 14.2)

17. Piecemeal changes and patch-work planning should be superseded by a total systems approach, and perspective projections.

(Para 15.2)

18. Technology levels in the workshops are inadequate to meet future challenges. They should be modernised to increase the quality of output and reduce repair time.

(Para 16.3)

19. Specialised agencies should be involved at grass root levels for modernisation. A specific Technology Plan should be framed. Facilities should be set up to evolve the most cost-effective repair procedures.

(Para 20.2)

20. RITES can be asked to prepare the basic layouts for the major workshops while COFMOW can be entrusted with the formulation of a Technology Plan. COFMOW should be given continuing responsibility as the clearing house for production and maintenance technology.

(Paras 20.2 and 20.3)

21. RITES and COFMOW should be given assistance in the matter of planning of rationalisation and modernisation from the Planning Cells within the zonal railways.

(Para 20.3)



22. For certain specialised fields RITFS should be free to take consultancy from outside.

(Para 20.6)

23. A Central Institute for Manufacture, Repair and Maintenance Technology should be set up for bringing about and experimenting with new ideas about maintenance methodology and practices. It should also serve as the nucleus for training in advanced technology and equipment.

(Paras 21.3 and 21.4)

24. It is not desirable to postpone the use of computerised production control systems in the major workshops.

(Para 23.1)

25. A special task force should be set up to chalk out the requirements of one workshop and develop the (computer) system over a period of two to three years before extending the coverage to other units.

(Para 23.3)

26. A centralised thrust is necessary to identify the needs of computerised production control and management information systems. Alongwith these inputs, training is necessary at all levels.

(Paras 23.3 and 23.4)

27. Industrial engineering cells should be set up in each workshop to ensure cost-effectiveness, quality consciousness and continuous updating of technology and methods.

(Para 24.2)

28. While higher levels of utilisation should be achieved in practice, maintenance planning should be based on a continuous capacity utilisation of eighty per cent in the workshops. The gap between arisings and workshop capacity should be made good on the highest priority. Expenditure on improving availability of existing assets should be preferred even to acquisition of an incremental stock.

(Para 25.2)

29. The Railways should create additional POH capacity in advance of materialisation of POH workload in the Sixth and Seventh Five Year Plan periods to liquidate the existing backlog.

(Para 25.4)

30. Shortfalls have also to be made good in the homing capacity of locomotive sheds, sick lines and washing lines.

(Para 25.5)

31. A guideline should be adopted between the costs of need-based maintenance facilities and incremental stock, in order to evaluate phasing of funding and projection of requirement.

(Para 26.3)

32. It is estimated that at the start of the Sixth Plan, at current period, about Rs. 500 crores were necessary to make good the backlog of maintenance facilities and another Rs. 900 crores to meet the needs of the additional rolling stock fleet up to 2000 AD.

(Paras 26.4 and 26.5)

33. As the proportion of expenditure on capacity-adding machinery and plant to the total cost of maintenance projects is presently inadequate, such investments should be made more pragmatic.

(Paras 27.1 and 27.3)

34. Open line maintenance should not be permitted to mushroom as a fire-fighting measure at the cost of a long-term efficient system.

(Paras 28.1 and 28.4)

35. The present generation of production machinery should be installed as part of modernisation, as otherwise even the new equipment may become obsolete in a very short while.

(Para 29.1)

## Chapter III

### Maintenance

36. Closure of steam sheds should be to a well-defined perspective plan, that is both in numbers and locations. Only a limited number of regional workshops and sheds may be conserved and non-IRS locomotives discarded before the end of the Seventh Five Year Plan, to conserve on resources.

(Para 2.3)

37. Retention of skilled manpower on steam would have to continue for 12 to 14 years. An Expert Group should be set up to plan the man power transition.

(Paras 2.4 and 3.2)

38. A detailed plan should be framed on the alternative use of the land and covered accommodation of steam sheds.

(Para 3.3)

39. Rationalisation and modernisation schemes should be linked with a concrete traction plan. Such a plan should be worked out urgently and widely circulated.

(Para 3.4)

40. For diesel and electric locomotives, a four-part maintenance system should be adopted in order to optimise equipment usage.

(Para 4.2)

41. For diesel locomotives three re-build workshops-two on the BG and one on the MG-should be set up with a rated capacity each of about six locomotives per month.

(Para 4.6)

42. The need for rebuild in the case of electric locomotives should be studied.

(Para 4.8)

43. The standard layouts of locomotive sheds are outdated and should be recast, taking into account field experience.

(Paras 5.2 and 5.3)

44. Standard internal layout of repair sections and sequencing of work should be scientifically developed including the designs of jigs, fixtures and test stands.

(Paras 5.5 and 5.6)

45. Comprehensive updating of layouts, facilities and methodology of work should be undertaken either by a Group of Experts or alternatively, RITES should be engaged to do this work.

(Para 5.7)



46. Simple electronic data processing facilities should be provided in the main line sheds for life monitoring of parts, locomotive histories, failure correlations and statistical returns of fuel etc. The equipment should be shared with the data entry system in the attached stores depots.

(Paras 6.3 and 6.4)

47. Centralised manufacture of special plant and equipment for locomotive sheds should be taken up in one workshop.

(Para 7.1)

48. Shed management should be distributed along functional responsibilities to provide for quality audit and industrial engineering functions.

(Paras 8.2 and 8.3)

49. By adjustment within the cadre, an Accounts Officer should be provided at each major shed.

(Paras 8.5 and 8.6)

50. There should be direct supervision at the management levels for cost-intensive activities, such as fuel installations, refining plants, as well as for equipment maintenance.

(Para 8.7)

51. Wagon maintenance has to be conceived for bulk movement with unbroken rakes.

(Para 10.2)

52. Design, manufacture, and maintenance should take into account the planned heavier trailing loads that dictate the need for higher wagon reliability, brake efficiency and quicker marshalling capability.

(Para 10.4)

53. Enforcement of maintenance discipline should be given sanctity.

(Para 10.5)

54. Overaged wagons should be replaced within two years, commencing March 1982, or at best, for a maximum of one more year, as this is an important factor in operational strategy for the future.

(Paras 11.3 and 11.4)

55. The codal life of wagons should be fixed on systems considerations, including cost of obsolescence. Four-wheeled wagons should be phased out at an accelerated pace, and no modifications need be undertaken on them.

(Paras 11.3, 11.4 and 11.9)

56. Handling and operational care should be exercised to reduce wagon sickness.

(Para 12.1)

57. Maintenance strategy should be based on a clear sub division of work between workshops, sick lines and yards.

(Para 13.1)

58. An annual preventive maintenance for wagons should be experimented with in one depot, in a single high density closed circuit.

(Para 13.2)

59. Wagons should be offered for intensive examination in the empty direction only, at points nominated for this purpose on the basis of streams of traffic.

(Para 13.5)

60. Wagons should be taken for POH based on due dates and not on loadability. The capital and managerial shortfalls and deficiencies, in returning to the concept of preventive maintenance should be made good.

(Para 13.6)

61. All India Train Examining orders should be evolved so as to eliminate both redundant examinations and by-passing necessary maintenance attention.

(Para 14.1)

62. A running department on the C & W side should be set under each Chief Rolling Stock Engineer to monitor the movements and maintenance of goods trains.

(Para 14.2)

63. Work should be so conceived that no wagon takes more than 24 hours in a sick line. Placement and withdrawal should be done twice a day on two shift working.

(Para 15.1)

64. A programme should be drawn up to implement the suggestions of the Committee for Modernisation of Sick Lines. Standard high quality tooling packages and adequate number of spare wheel-sets are essential.

(Para 15.2)

65. Pit wheel lathes may be provided at points likely to have arisings of about 15 wheel sets per day. The desirability of setting up local wheel pressing facilities at heavy points, located at distances from workshops, should be looked into.

(Para 15.5)

66. In the departure yards, lines should be left over to provide for movement of tractor trolleys for carrying equipment and materials for repairs. In the transit yards, the same can be achieved by paving the pathway between the tracks.

(Para 16.1)

67. (1) A system of maintenance should be adopted which permit a movement pattern, allowing the wagons in a rake to roll over distances of 1,000 kms. without requiring any examination, upto 2,000 kms. with only one vacuum-upgradation and beyond 2,000 kms. with two vacuum-upgradations.

(2) Requisite facilities should be created at the terminals for examination.

(3) Wagon designs should be developed which will promote such movement-patterns and such train examination systems.

(Paras 17.4 and 17.5)

68. Examination gangs should be strengthened realistically, along with reduced requirement of staff for providing attention to four-wheeler stock.

(Para 17.7)

69. Wagon workshops should be designed with flexible layouts for high capacity utilisation in spite of different types of wagons. The Central Institute for Manufacture, Repair and Maintenance Technology should apply itself to this problem. Workshop output targets should be redefined as recommended.

(Paras 18.2 and 18.4)

70. Wagons should be fabricated from corrosion resistant steels. Relaxations to material specifications should not be given in future.

(Para 19.2)



71. Continuous R & D should be undertaken to ensure reliability of brake valves.

(Para 19.3)

72. A sturdier bogie design should be adopted.

(Para 19.4)

73. The design of roller bearing should be studied in depth with a view to adopting types that do not place any maintenance responsibility outside the workshops.

(Para 19.5)

74. Passenger carrying capacity should be increased along with a priority investment plan for maintenance of coaches.

(Para 20.2)

75. Coaches should be given overhaul once a year. Sick line capacity should be provided based on one sick marking per month. The capacity on the BG needs considerable increase, while on the MG the thrust should be to improve the existing facilities.

(Para 22.1)

76. Coaching maintenance should be linked to usage. The Medical Department should be brought into the up-keep of coaches and to ensure sterile water supply, periodical disinfection, and use of pesticides. Consumer reaction should be sought.

(Para 23.1)

77. The requirements for modernising coach maintenance facilities in the open line should be immediately studied by an Expert Group on given as a consultancy to an organisation such as RITES.

(Para 24.1)

78. A single washing-gum-maintenance line should be provided for routine maintenance. Mechanised washing should be done in motion on a line of about 675 metres length and this should not involve more than one placement for one rake.

(Para 25.1)

79. The unit exchange system should be adopted in coaching depots, especially for air-conditioned coaches.

(Para 26.1)

80. Transit time for maintenance, and repair time during POH, should be brought down as a measure to improve availability of coaching stock.

(Paras 27.1, 27.3 and 27.5)

81. Complete rakes should be taken into workshops and turned out together.

(Para 28.4)

82. For conventional coaches, a minimum capacity of 25 units per day and for EMUs 12 units per day should be adopted as a guide for workshop capacity.

(Para 29.2)

83. This would result in a reduction of the number of MG POH shops at present estimated for the terminal year of the century. On BG 16 workshops should suffice to cater for even a lower POH period and incremental stock.

(Para 29.2)

84. Configuration diagrams of amenity fittings on standard coaches and physical and schematic designs for

electrical fittings should be provided to the maintenance staff.

(Paras 30.1 and 30.2)

85. Coach attendants should maintain log-books and make round trip reports. They should be given training in maintenance.

(Paras 30.3 and 31.1)

86. The Maintenance Organisation should take over the responsibility for provision of fire extinguishers and their checking.

(Para 32.2)

87. Pre-warning devices for fire should be provided.

(Para 32.3)

88. Coaching Maintenance should be brought under a single management. Coaching and Wagon Maintenance management should be separated, commencing with Divisions on which the metropolitan cities are located.

(Paras 33.1 and 34.1)

89. Technology improvement in coaches should be directed towards elimination of corrosion, higher speed capability, greater scale of amenity fittings, and better vestibuling.

Para 35.1)

## Chapter IV

### Production

90. A substantial increase in production capacity has to be planned for all types of rolling stock, other than wagons.

Para 3.1)

91. A second electric locomotive manufacturing unit should be set up as an integral part of the electrification programme.

Para 4.1)

92. Production base for lower H.P. shunting locomotive should be expanded, and, if the non-railway sector is not found suitable, the Railways should plan to put up their own unit for this purpose.

(Para 4.2)

93. Electric locomotive production should be stepped up to 100 by 1985-86 and a peak production of 190 should be achieved by 1991-92 to meet requirements.

(Para 4.3)

94. The Railways should plan for 700 coaches per year from ICF and 525 from BEML, leaving 50 and 25 respectively from these units for export.

(Para 5.2)

95. It is essential to set up one EMU manufacturing unit, as otherwise the Railways will be caught up in a very serious situation in the commuter areas. While determining the capacity of this additional Production Unit, the optimised capacity of JESSOPS, who should thereupon manufacture only EMUs, should be taken into account.

(Para 5.3)

96. There should be no further delay in the setting up of an additional coach factory for manufacture of conventional coaches with a rated capacity of about 1220 coaches.

(Paras 5.3 and 5.4)



97. The Railways should set up one more captive steel foundry.

(Para 7.2)

98. The Railways should set up centralised spring manufacture in one of their workshops.

(Para 8.1)

99. A perspective production plan should be drawn up. A Production Directorate in the Railway Board should not only monitor the planning and development of a large number of Production Units, but also co-ordinate the development of spares essential for maintenance.

(Paras 9.2 and 9.3)

100. The Production Units should be given a firm production programme at least two years in advance.

(Para 11.3)

101. Production Units should set up regional service engineering organisations.

(Para 12.1)

102. These Cells should be associated with commissioning, inspection of faced parts, technical guidance on modifications, and should provide the basic liaison between the zonal railways and the design and spares departments of the Production Units.

(Para 13.2)

103. To service non-railway users of locomotives, these cells should carry out maintenance, on the Railways, on payment.

(Para 14.2)

104. In all future plants, and in the existing plants as and when they are revamped, adequate capacity for manufacture of spare parts should be provided.

(Para 15.2)

105. For critical items obtained from trade, the Production Units should take over responsibility for supply to zonal railways.

(Para 15.4)

106. The scope of initial spares supply should be examined and should cover all components on which a design change has been made.

(Para 15.5)

107. Production Units should be provided with Development Cells which should take over R & D functions on component design, layout engineering, and use of alternative materials.

(Paras 16.2, 16.3 and 16.4)

108. Value engineering should be adopted as a formal discipline in the Production Units.

(Para 17.1)

109. The introduction of on-line computerised production control systems in the Production Units should be hastened.

(Para 18.3)

## Chapter V

### Quality Assurance

110. The Workshop Incentive Bonus Scheme needs drastic and fundamental changes. An Expert Group should go into the entire question.

(Paras 3.1, 3.2 and 4.2)

111. Third party inspection must be given due importance in the Production Units.

(Para 5.1)

112. Neutral examination, as at present, should be altogether dispensed with.

(Para 5.5)

113. The Chief Motive Power Engineer and the Chief Rolling Stock Engineer on each zonal railway should be provided with their own Inspection Organisation to cover the POH workshop.

(Para 5.6)

114. The role of Inspectors in the Production Units should be redefined, and customer hold-points established at various manufacturing stages.

(Para 5.9)

115. Very limited relaxations, including those to vendors, may be given for a time bound period and only in consultation with the Inspectors. In an extreme case of non-agreement, the Production Directorate of the Board should have the final say.

(Para 5.10)

116. Internal inspection should be strengthened with proper equipment, that is quick and accurate.

(Para 5.11)

117. The practice of the zonal railways having their own numbering system for drawings should be dispensed with. Production Units should issue an annual compendium of latest drawings and specifications.

(Para 6.1)

118. The workshops should be reorganised on a regional pattern and taken away from the purview of open line managements.

(Para 8.3)

119. In the workshops, all departments should be brought under common management.

(Para 8.4)

120. Building maintenance and minor works budgets in the workshops should be itemised, and provided separately for the workshops.

(Para 8.5)

121. Span of control should be reduced by strengthening management in industrial engineering, inspection fuel management and planning.

(Paras 9.2 and 9.3)

122. A yard-stick should be laid-down for the number of staff per supervisor and the span of control of foremen.

(Para 9.4)

123. Workshop Officers should regularly visit units outside the Railways to study specific methods and technologies. There should also be institutional lateral contacts between Workshops. A Workshop Coordination Group should be set up and the Railway Board should take a formal view of recommendations made and also ensure implementation of the accepted suggestions.

(Paras 10.1, 10.2, 10.3 and 10.4)



## Chapter VI

## Export

124. Both commercial and technological inputs are necessary to improve the performance of railway equipment export.

(Para 1.3)

125. The Projects and Equipment Corporation will have to be associated with any policy changes, and better coordination has to be established between PEC and the manufacturers.

(Para 2.1)

126. A clear long term policy should be enunciated that brings all organisations into a common objective. High level support is necessary for its implementation.

(Para 3.1)

127. Cost of manufacture of export production should be cut down *inter alia* by administrative and infrastructural overheads not being levied to export product in due proportion to total production.

(Para 4.1)

128. Reduction of freight charges for volume critical railway equipment exports should be examined by Government, if necessary, by providing a freight subsidy.

(Para 4.2)

129. A flexible approach should be adopted in credit policy, in order to maintain continuity in markets with a long-term interest.

(Para 4.3)

130. The strength of the export base should be firmmed up, by the Railways releasing some orders on BEML for MG coaches on a regular basis.

(Para 4.4)

131. The proposed Production Unit for EMUs should have an export bias. Diesel Rail Car sets should also be developed since they have a large demand abroad.

(Paras 4.5 and 6.3)

132. Import of sub-systems and designs should be freely resorted to for meeting export requirements. The possibility of permitting departmental undertakings to retain a portion of their export earnings to finance new design and collaborations should be examined.

(Para 5.1)

133. A minimum speed capability of 160 kmph on the standard gauge and 130 kmph on the MG should be built up. For this purpose, a test track should be provided alongwith import of one or two suitable locomotives.

(Para 6.1)

134. Capability should be created for manufacture of coaches to U.I.C. and A.A.R. and other specifications for the purpose of export.

(Para 6.2)

135. Corrosion-resistant steels should be made available indigenously to strengthen wagon export.

(Para 7.1)

136. To cater to export markets, 1550 HP and 1800 HP diesels should be developed on the MG. Efforts to achieve greater fuel efficiency and improved design of components should also be made.

(Paras 8.1 and 8.2)

137. A consortium approach should be adopted between IRCON, RITES and PEC to enter international markets on a turn-key basis whenever required.

(Para 9.1)

Sd/. Prof. Ravi J. Mattha

Sd/. V.P. Sawhney

Sd/. Russi Mody

Sd/. M. Satyapal

Sd/. Justice H.C.P. Tripathi

Sd. H.C. Sarin  
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Jd. Dr. S.K. Ray  
(Secretary)

17 December, 1982.





सत्यमेव जयते

भारत सरकार Government of India  
रेल मंत्रालय Ministry of Railways

**REPORT**  
**OF**  
**THE RAILWAY REFORMS COMMITTEE**

**Part VI**

**FARE AND FREIGHT STRUCTURE**

**JANUARY, 1983**



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## INTRODUCTION

In the present Part of our Report we have examined the issues pertaining to the fare and freight structure of Indian Railways in the context of a programme for their rationalisation.

It is our considered view that it should be appropriate for the Railways to aim at achieving a return of 10 per cent to begin with on their Capital-at-charge under conditions of high standard of efficiency. For this, the Railways would have to take due cognizance of cost escalations and inflationary pressures. Simultaneously they have to make more serious endeavours towards optimisation of efficiency and productivity of the entire system. While saying so, we have also noted that in this connection a number of important recommendations made by the Rail Tariff Enquiry Committee 1980 (RTEC) remain to be implemented.

We have considered the different issues pertaining to fare and freight, and have dwelt on them in exclusive chapters on 'A Profile of the Problem,' 'Suburban Fares,' 'Non-Suburban Fares,' and 'Freight'. We have also given our conclusions at the end of each chapter. We have finally summarised our recommendations at one place in Chapter V.

As regards suburban fares, we consider that it was not quite fair to the Railways to make them bear a heavy financial burden resulting from concessional suburban fares in the major metropolitan cities. Our recommendations naturally, therefore, have flowed from such a premise and are framed on the economic principles of costing and pricing of an essential service. As adoption of these fundamental principles has gone by default in the past, there is an element of accumulated arrear which has impinged on the viability of these services. Appreciating that the entire rationalisation cannot be executed in one stroke, we have recommended that this may be done in appropriate phases.

As for non-suburban fares, we feel that the Railways should not deal with the fare structure in an ad-hoc and piecemeal manner as has been done in the past, but that the fares should have a clear rationale and a close linkage with costs.

We have looked at the entire question of rationalising the non-suburban fare structure, from the angle of the recommendations made by RTEC, together with the need for an outright improvement in the quality of service. We have accordingly made specific recommendations, inter alia, regarding the updating of rates for determining the level of fares to be charged for various classes and distances of travel.

As regards freight, we broadly support the formula on the basic scale suggested by RTEC and would have expected the Railways to have taken a firm decision on this recommendation by now. We have also recommended that the supplementary charges are anachronistic and should go; the 'taper' suggested by RTEC is considered by us too steep and, therefore, its sharpness should be reduced; and that for a distance slab fare and freight should be calculated at the ceiling of each slab. We also believe that too frequent and ad-hoc freight revisions are inconvenient and undesirable and that these should normally be done once a year.

We consider that in the furtherance of improvements in service, not only the Railways should implement the recommendations made in this Part, in a forthright manner, but at the same time should appreciate that they have very little option in the matter, as the need for rationalising the finances of the Railways is paramount in the present situation.

Finally, we have deliberately submitted this Report to the Government in time for the 1983-84 Railway Budget.



# CHAPTER I

## A PROFILE OF THE PROBLEM

### 1.0. Introduction.

1.1. The Railways financially are in distress. Though a big slice of public funds has been invested on them, they have not been able to earn enough for meeting their replacement and development needs nor have been able to pay full dividend to the General Revenues. Their indebtedness to General Revenues is estimated at Rs. 532.9 crores on 31 March, 1983. This is made up of :

	(Rupees in crores)
1. Deferred Dividend Liability	308.82
2. Loans taken to finance expenditure on works chargeable to Development Fund (DF).	224.17*
<b>Total</b>	<b>532.99</b>

1.2. The Railways were consistently showing surplus till 1965-66. It is only thereafter that they entered an era of deficits. The deficits would have been much higher had the Railways contributed adequately to the Depreciation Reserve Fund (DRF). The Railways have had to borrow money from the General Revenues to finance works chargeable to DF and have over the years accumulated a loan liability as indicated in Para 1.1.

1.3. The ratio† of net revenue‡ to Capital-at-charge is a good and simple indicator of the financial health of an undertaking such as the Railways.

1.4. The percentage of net revenue to Capital-at-charge, the average borrowing rate, the dividend paid and the Railways' net surplus/deficit (after payment of dividend) are shown year-wise from 1950-51 to 1982-83 in Table 1.1.

Table 1.1

Ratio of net revenue to Capital-at-charge vis-a-vis average borrowing rate

Year	Capital at-charge (Rupees in crores)	Net Revenue (Rupees in crores)	Percentage of net revenue to Capital-at-charge	Average borrowing rate by the Government	Obligatory dividend paid (Rupees in crores)	Surplus (+) or Deficit (-)
1	2	3	4	5	6	7
1950-51	827	48	5.8	3.16	33	15
1951-52	850	62	7.3	3.12	33	28
1952-53	857	47	5.5	3.11	34	13
1953-54	869	37	4.2	3.14	34	3
1954-55	902	44	4.9	3.19	35	9
1955-56	969	50	5.2	3.25	36	14
1956-57	1,072	58	5.4	3.29	38	20
1957-58	1,222	58	4.7	3.36	44	13
1958-59	1,357	59	4.4	3.45	50	9
1959-60	1,432	75	5.2	3.55	54	20
1960-61	1,521	88	5.8	3.57	56	32
1961-62	1,683	100	5.9	3.59	63	24
1962-63	1,897	123	6.6	3.66	69	24
1963-64	2,160	145	6.7	3.75	83	49
1964-65	2,435	118	4.9	3.84	92	13
1965-66	2,680	135	5.0	3.93	104	19
1966-67	2,842	114	4.0	4.05	132	(-)- 18
1967-68	2,978	110	3.7	4.22	142	(-)- 32
1968-69	3,101	143	4.6	4.33	151	(-)- 8
1969-70	3,196	147	4.6	4.43	156	(-)- 10
1970-71	3,331	145	4.3	4.53	165	(-)- 20
1971-72	3,521	169	4.8	4.65	151	(-)- 18
1972-73	3,726	164	4.4	4.77	162	(+)- 3
1973-74	3,893	54	1.4	4.92	171	(-)- 116
1974-75	4,106	74	1.8	5.50	187	(-)- 114
1975-76	4,335	137	3.1	5.30	198	(-)- 61
1976-77	4,534	296	6.5	5.40	209	(+)- 87
1977-78	4,797	353	7.4	5.50	227	(+)- 126
1978-79	5,024	261	5.2	5.63	224	(+)- 37
1979-80	5,485	227	4.1	5.82	294 Due 227 Paid	(-)- 66
1980-81	6,096	27	2.1	6.10	325 Due 127 Paid	(-)- 198
1981-82 (RE)	6,640	422	6.4	6.30	370	(+)- 52
1982-83 (BE)	7,144	515	7.2	6.50	405	(+)- 110

\* In Part IV of our Report it has been recommended that the cost of quarters charged to DF in the past should be written back to Capital. With this, the loan liability would get reduced from Rs. 224.17 crores to Rs. 97.70 crores.

† This is similar to ratio of Gross profits to externally raised capital in commercial accounting.

‡ This is the surplus left before payment of dividend and appropriation to Development Fund.

Source : 1. Explanatory Memorandum on the Railway Budget 1982-83.

2. Indian Railways Year Book 1980-81.

3. Annual Report and Accounts 1980-81.

RE stands for Revised Estimate.

BE stands for Budget Estimate.

@On the Capital invested upto 31 March 1964, the rate of dividend is 4.5% with an addition of 1% in lieu of the tax on passenger fares. The rate of dividend is 6% on the Capital invested after 31 March 1964. Besides, there are certain investments which are exempted from dividend liability or attract lesser rate of dividend.



1.5. In 1951-52, the ratio of net revenue to Capital-at-charge was 7.3 per cent and it declined to 1.4 per cent in 1973-74. The net return on the Capital-at-charge recovered in the next few years but again dropped to 2.1 per cent in 1980-81. In 1982-83 it is expected to be 7.2 per cent, the highest so far since 1951-52.

1.6 We would like to draw attention to the fact that the percentage of net revenue to Capital-at-charge has to be read with caution. A simple comparison of the percentage for various years to judge the relative financial performance is likely to give misleading results. For instance, during the period 1950-51 to 1964-65, the percentage of net revenue to Capital-at-charge ranged from 4.2 per cent (1953-54) to 7.3 per cent (1951-52), as against the average borrowing rate varying from 3.11 per cent (1952-53) to 3.84 per cent (1964-65). The return of 7.2 per cent anticipated in 1982-83 is, in absolute terms, comparable to the return achieved in the past, in fact, even better for most of the years. But, if one considers that the average borrowing rate in the past i.e. the cost of capital, ranged from 3.11 to 3.84 per cent, as against 6.5 per cent now, one cannot help reaching the conclusion that the real return anticipated in 1982-83 is less than that obtained in the past.

1.7. We would also like to add that the ratio of net revenue to Capital-at-charge would have had a precipitous drop, if the contribution to DRF had been adequate. The present financial performance of the Railways thus does not compare favourably with that in earlier years.

## 2.0. The Surplus.

2.1. RTEC had gone into this question extensively. They felt that in India beset with scarcity of capital, it would be undesirable not to earn an appropriate surplus on the capital invested. After reckoning with the views of the Planning Commission and the Ministry of Finance in the matter as also the record of the public, and private sector enterprises, they suggested that the Railways should aim at earning a minimum surplus of 10 per cent on the Capital-at-charge. This rate would be inclusive of dividend but exclusive of depreciation.

2.2 We note that in the Sixth Five Year Plan (1980-85), the Planning Commission has emphasised the need to run public sector transport organisations like the Railways, Road Transport Corporations etc. on a remunerative basis due to the extremely difficult position of resource availability. The Sixth Plan clearly brings out the need to eliminate losses and earn a surplus, as such organisations should not be a drain on the national exchequer but should be largely self-sustaining. Having regard to these considerations and the recommendations made in this respect by the National Transport Policy Committee (NTPC) 1980 and RTEC, the Planning Commission have stipulated that transport undertakings should be required to cover their short-run operating costs and yield a reasonable rate of return on the capital employed. The Planning Commission further stated :

"While tariffs of transport organisations would be suitably enhanced, wherever necessary, care will be taken that these increases are not made to cover avoidable fall in productivity, particularly in sectors where the organisation has a monopolistic or semi-monopolistic position".

2.3. The Railway Convention Committee 1980 (RCC) while going into this question compared for various years the net return on Capital-at-charge with the average borrowing rate. This comparison is illustrated in a graph (Page 273).

2.4. The net return on Capital-at-charge has always been more than the average borrowing rate till 1965-66. It was only from 1966-67 that the ratio in most of the years was less than the average borrowing rate. RCC viewed this adverse trend seriously and stressed that the return on Capital-at-charge should be more than the average borrowing rate and that the Railways "should substantially augment their earning capacity by subjecting their investment proposals to stricter test of remunerativeness commensurate with the constantly rising cost of capital; otherwise it is doubtful whether the Railways will be in a position to pay dividend even at the bare interest rate in the foreseeable future".

2.5. We find that after the submission of the RTEC report, the average borrowing rate i.e. the cost of capital has gone up from 5.8 percent in 1979-80 to 6.5 per cent in 1982-83.

2.6 The rates of dividend on the capital invested on the Railways have also gone up. RCC 1980 in their Report presented to the Parliament on 5th November, 1982 have recommended the following rates of dividend for the period 1980-84 :

1. 6 per cent on the Capital invested upto 31 March, 1980 (inclusive of 1.5 per cent on the Capital invested upto 31st March, 1964 for payment to States in lieu of passenger fare tax etc).
2. 6.5 per cent on the Capital invested after 31st March, 1980.

The rates prior to this recommendation were :

1. 5.5 per cent on the Capital invested upto 31st March, 1964 (inclusive of 1 per cent for payment to States in lieu of passenger fares tax etc).
2. 6 per cent on the Capital invested after 31st March, 1964.

2.7. Because of the higher rates of dividend now to be paid by the Railways, there is a case for the percentage return of Net Revenue to Capital-at-charge being fixed at more than 10 per cent recommended by RTEC in 1980. We, however, feel that in view of the difficult financial position in which the Railways are placed today and the fact that they have now to appropriate much larger sums to DRF, it would be quite an accomplishment if for the immediate future the Railways could manage to earn even a 10 per cent return on their Capital-at-charge.

2.8. We would like to mention that the Capital-at-charge which represents the original cost of assets is only a fraction of what the assets would cost now. The rate of 10 percent on the Capital-at-charge is thus a small percentage on the current cost of the capital employed and should not, therefore, be considered as an impossible or too ambitious a rate of return. In fact when the situation improves and the Railways gear up their operational performance and ruthlessly eliminate waste, they should be in a position to increase their earnings. They could



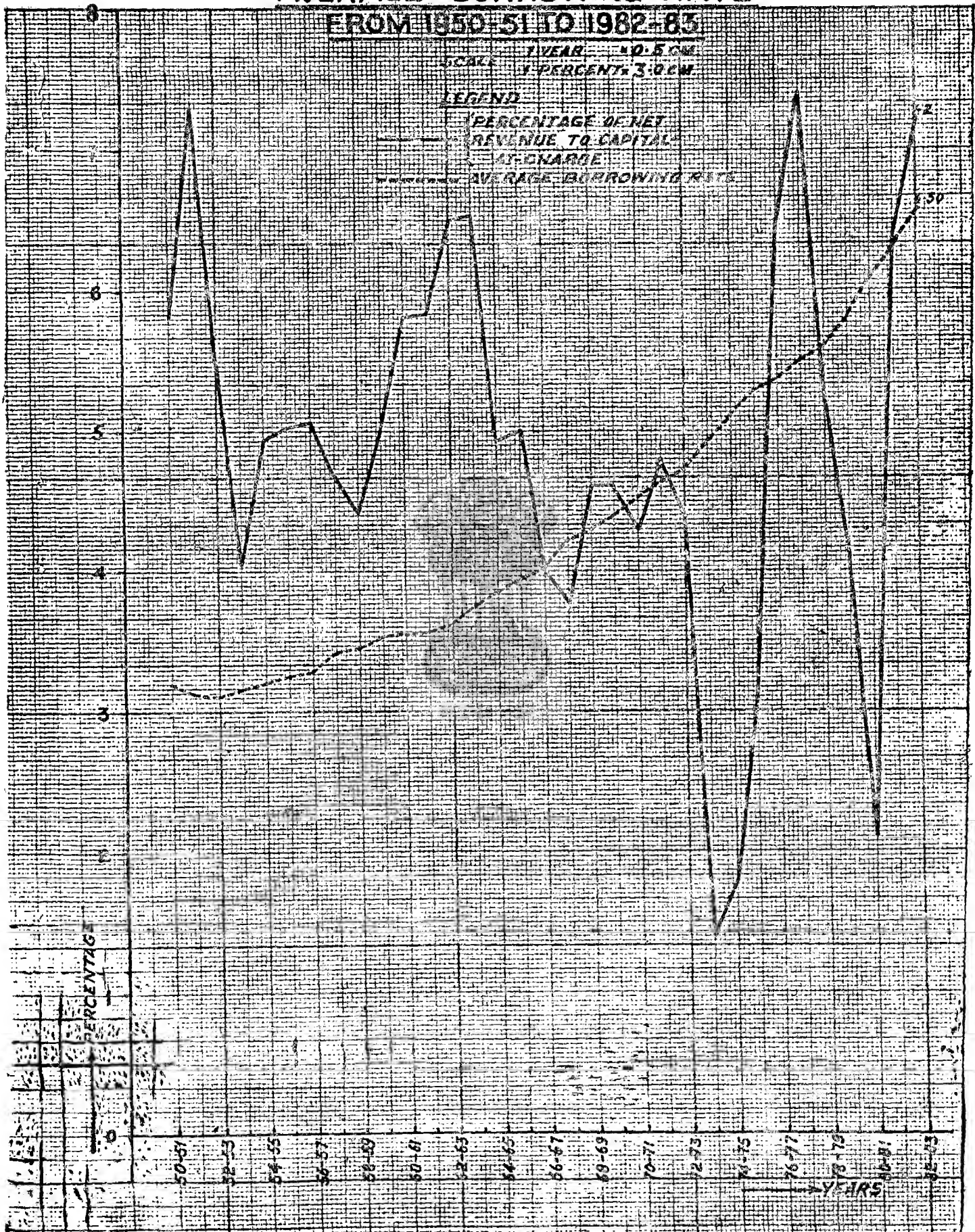
# NET REVENUE TO CAPITAL-AT-CHARGE AND AVERAGE BORROWING RATE

FROM 1950-51 TO 1982-83

SCALE 1 YEAR = 10.5 CM  
1 PERCENT = 3.0 CM

## LEGEND

— PERCENTAGE OF NET  
REVENUE TO CAPITAL  
AT-CHARGE  
— AVERAGE BORROWING RATE





then aim to relate the rate of return on the current value of the assets rather than to the Capital-at-charge.

2.9. We feel that it is essential to clearly lay down how much net surplus over and above the dividend payable to the General Revenue, the Railways should earn in a normal year based on efficient operations. It is only when such an objective is set that the Railways would be in a position to formulate a proper tariff structure. The failure to provide such an objective has, as rightly pointed out by RTEC, resulted in the tariff structure being left rather rudderless.

### 3.0. Strategy.

3.1. The Railways shall have to adopt a two-pronged strategy to re-establish their financial viability. They would have to take concrete and effective steps to improve the productivity and efficiency of the system and simultaneously rationalise their pricing policy.

3.2. We are conscious of the fact that a unilateral increase in fare and freight, without a corresponding improvement in the efficiency of operation and reduction in operating expenses, is not likely to carry the Railways very far. Such a step will not motivate the system to take productivity to the desired levels and will only cause the rail user greater discontent. The element of efficiency should, therefore, be inbuilt in the fare and freight structure.

3.3. To achieve the optimum level of performance, the Railways will have to take strong measures on all fronts like punctual running of trains, efficient maintenance and rehabilitation of track and rolling stock, extensive and efficient utilisation of their assets, economies in fuel and staff, a thorough and probing scrutiny of the investment proposals, completion of the work in time, reducing thefts and robbery, and adopting well-conceived all out marketing strategies to capture more and more traffic. Some of these aspects have already been dealt with by us in our earlier Reports and the others will be commented upon in the Reports to follow.

### 4.0. Pricing of the services.

4.1. The Railways have systematically followed the policy of under-pricing their services and have taken very little cognizance of the rising costs of staff, fuel and other stores, which have greatly pushed up their working expenses. An idea of the quantitative gap between the prices charged for the transport services provided by the Railways and the prices paid by them for the various inputs can be derived from Table 1.2 (page 11).

4.2. Because of the variety of inputs used by the Railways in their operations, it is not easy to isolate any particular cost index with which the average earning per passenger kilometre or the average amount realised per tonne kilometre could be compared to get a precise idea of the extent to which the fares and freight have trailed behind.

Table 1.2

Prices charged vis-a-vis prices paid

	(1970-71 = 100)			
	1979-80		1980-81	
	Revenue Index	Cost Index	Revenue Index	Cost Index
Unit revenue.				
Average receipt per Passenger km.	148.8	...	158.8	...
Average receipt per tonne km.	177.5	...	193.4	...
Input costs.				
Average annual cost per employee.	...	224.2	...	248.2
Price of fuel				
Coal	...	299.5	...	347.6
Mineral oils	...	308.8	...	413.6
Electricity	...	225.6	...	239.7
Price of iron & steel	...	258.5	...	272.4
Price of cement	...	229.0	...	232.6
Whole sale price index	...	217.6	...	257.3

4.3. We have attempted to work out a composite wage-cum-price index by giving weightage to the major categories of expenditure incurred by the Railways. In this regard, we have also drawn upon the work done by RTEC, who after analysing the working expenses for the period 1977-78 to 1980-81 arrived at the following shares of the major inputs :

1. Staff	..	..	55 per cent
2. Fuel	..	..	22 per cent
3. Other stores & material	..	..	23 per cent

4.4. The cost indices used by us for the above three components of expenses are :

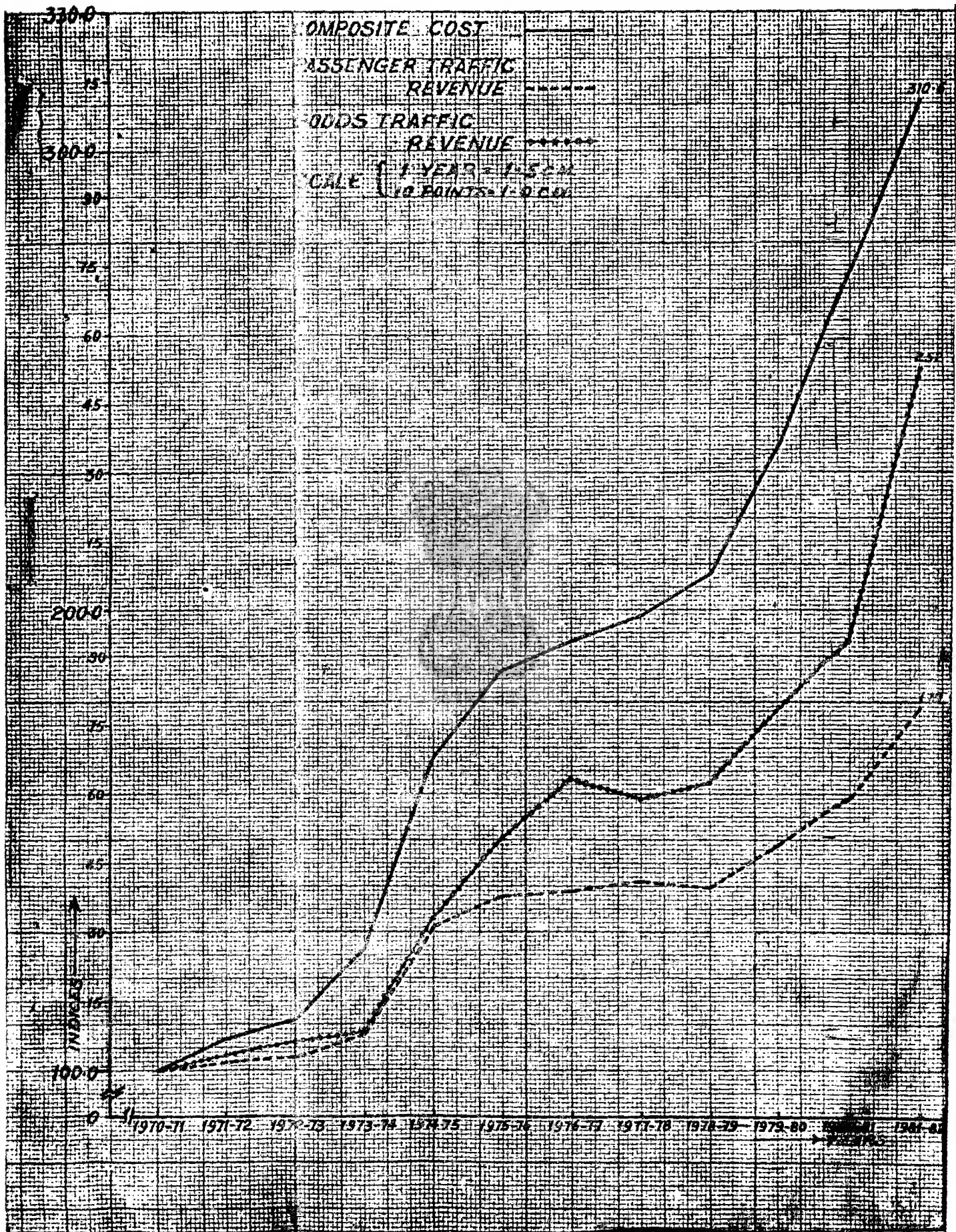
1. Staff	Staff cost index*
2. Fuel	Wholesale price index number for fuel, power, light and lubricants.
3. Other stores & material	Wholesale price index number for all commodities.

4.5. The composite wage-cum-price index number would thus be :

$$\begin{aligned}
 & 0.55 \times (\text{staff cost index}) \\
 & + 0.22 \times (\text{wholesale price index number for fuel, power etc.}) \\
 & + 0.23 \times (\text{wholesale price index number for all commodities}).
 \end{aligned}$$

\*Worked out by PRC Secretariat on the basis of the average annual cost per Railway employee as given in the Indian Railways Annual Report.



COST AND REVENUE INDICES



4.6. The composite cost indices for each year from 1970-71 to 1981-82 have been worked out and compared with the rates charged per passenger kilometre/ per tonne kilometre. Table 1.3 gives the position.

4.7. During the period 1970-71 to 1981-82, though the composite Wage-cum-price index shot up by 210 per cent the rate charged per passenger kilometre went up only by 79 per cent and that per tonne kilometre by 152 per cent. The picture is depicted graphically.

4.8. In our view a tariff policy which does not consider the impact of cascading inflation is unsound. Such a policy would not only be detrimental to the financial viability of the system, but would also encourage a drift of traffic in violation of scientific principles of inter-modal traffic-mix.

Table 1.3

## Cost indices vis-a-vis the rate charged

Year	Composite Cost† Index	Passenger traffic		Goods traffic	
		Rate per passenger km.	Revenue Index	Rate per tonne km.	Revenue Index
		(In paise)	(In paise)	(In paise)	(In paise)
1	2	3	4	5	6
1970-71	100.0	2.50	100	5.43	100
1971-72	105.7	2.55	102	5.61	103
1972-73	111.0	2.57	103	5.74	106
1973-74	126.1	2.71	108	5.89	108
1974-75	167.6	3.27	131	7.16	132
1975-76	186.4	3.46	138	8.12	150
1976-77	192.6	3.47	139	8.86	163
1977-78	198.8	3.52	141	8.64	159
1978-79	207.2	3.49	140	8.80	162
1979-80	235.2	3.72	149	9.64	178
1980-81	273.6	3.97	159	10.50	193
1981-82	310.6	4.48	179	13.70	252

4.9. In Part IV of our Report on Railway Reserve Funds, we have emphasised the need for an immediate review of the cost and price structure of the transport services provided by the Railways. We felt that the contribution to DRF taken at the level of Rs. 1,110 crores, as recommended by us would necessitate immediate revision of fares and freight. We also appreciated the fact that the failures of the past should not pose a serious burden on the rail-user of today and in this context suggested that the amount of Rs. 260 crores, included in the figure of Rs. 1,110 crores, to wipe out the arrears, should not be taken into account for revision of fares and freight.

4.10. RTEC went into the question of revision of fares and freight in great detail and made a number of useful and valuable recommendations,\* keeping in view, among other factors, the cost of service. In view of RTEC having already dealt with the issue quite comprehensively, there does not appear any need for fresh investigation or collection of evidence just now. We have, therefore, based our recommendations on the work already done by RTEC and other high level Committees.

4.11. Even though our recommendations would cover all the segments of fare and freight structure, they would generally be broad in perspective, the details and specifics being left to the Railways themselves.

## 5.0. Conclusions.

5.1. The Railways should aim at achieving at least a return of 10 per cent on their Capital-at-charge.

5.2. They will have to take concrete and effective steps to improve the operational efficiency, productivity and viability of the system.

5.3. The Railways have systematically under-priced their services and have not taken due cognizance of the increasing prices.

5.4. They have yet to implement several important recommendations made by RTEC 1980.

5.5. The fare and freight structure needs to be rationalised with due cognizance of the inflationary pressures.

Annexure—A.1.1

(Cf. Table 1.3.

## Statement showing movement of various cost indices

Year	Staff cost index	Wholesale price index number for fuel power etc.	Wholesale price index number for all commodities	Composite price-cum-wage index†
1	2	3	4	5
1970-71	100.0	100.0	100.0	100.0
1971-72	105.7	105.9	105.6	105.7
1972-73	109.2	110.1	116.2	111.0
1973-74	118.7	130.6	139.7	126.1
1974-75	152.3	198.3	174.9	167.6
1975-76	178.9	219.2	173.0	186.4
1976-77	185.8	230.8	176.6	193.6
1977-78	190.1	234.3	185.8	198.8
1978-79	201.2	244.7	185.8	207.2
1979-80	223.4	283.1	217.6	235.2
1980-81	248.2	354.3	257.3	273.6
1981-82	276.6	427.4	280.6	310.6

Source : Indian Railway Annual Report and Accounts—Statistical Summary (1980-81).

Figures for 1981-82 obtained from the Railway Board.

† Cf. Annexure A-1.1,

\* The Committee submitted an Interim Report in November 1978, the Main Report in Five Volumes in April 1980 and the Final Report in June 1980.

† Col. (5) = 0.55 × col. (2) + 0.22 × col. (3) + 0.23 × col. 4.



## CHAPTER II

### SUBURBAN FARES

#### 1.0. Introduction.

1.1. The Railways have been consistently losing on the suburban services in Bombay, Calcutta and Madras because of the highly concessional character of the monthly and quarterly season ticket fares. The losses have been steadily going up from year to year and the position in this regard from 1970-71 is given in Table 2.1.

Table 2.1.

**Suburban Losses**

Year	Loss*
	(Rupees in crores)
1970-71	12
1971-72	12
1972-73	13
1973-74	14
1974-75	19
1975-76	24
1976-77	25
1977-78	25
1978-79	26
1979-80	31
1980-81	34
1981-82 (estimated)	45

1.2. When the Government took over the Company Railways, the special concessional fares on the suburban services were allowed to continue. It was felt that if the suburban season ticket fares were brought on par with season ticket fares for other sections, it would entail a steep rise leading to popular resentment.

1.3. The season ticket fares have been revised in the past, but the increases have been in very small doses. The consideration which has weighed with the Government in not raising season ticket fares in step with the rise in costs have been to protect the interests of those who have to necessarily commute daily to and from their place of work to earn their livelihood. This concept was reaffirmed by the then Minister of Railways, who while introducing the Railway Budget for 1982-83 said :

“I am also of the firm conviction that any increase in fare and freight rates should not unduly burden the common man. I have, therefore, decided to completely exempt monthly season ticket-first class and second class, suburban and non-suburban from the proposed fare hike despite all the economic and financial considerations pointing to the contrary. I am sure the House will appreciate this gesture on my part at considerable sacrifice to the Railways.”

1.4. The element of subsidy in a monthly season ticket (MST) is so large that an MST on suburban sec-

tion is equivalent to only 6 to 14 single journeys for Second class and 3 to 5 single journeys for First class, the concession varying with distance. Table 2.2 gives the position for various distance slabs.

1.5. The First class monthly season ticket fare used to vary from 412 to 480 per cent of the Second class season ticket fares at different distances. In their Interim Report, RTEC had recommended that First class season ticket fares should be uniformly put at four times the Second class season ticket fares. This suggestion was made by them on the ground that the season ticket fares for First class had been raised much more in the past. This recommendation has been implemented from 1 April, 1979.

Table 2.2

**Equivalent number of single journeys in a MST**

Distance** slab (Kms.)	Equivalent number of single journeys in a MST	
	Second class	First class
1	2	3
1—5	9	3
6—10	13	4
11—15	13	5
16—20	13	5
21—25	14	5
26—30	11	4
31—35	10	5
36—40	10	5
41—45	9	5
46—50	9	5
51—60	8	5
61—70	8	4
71—80	8	4
81—90	7	4
91—100	7	4
101—110	7	4
111—120	7	4
121—130	7	4
131—140	7	4
141—150	6	4

1.6. The quarterly season ticket fares are charged on the basis of 2½ times the monthly season ticket fares. On the consideration that the number of persons who purchase such tickets is very small and can afford

\* This is inclusive of dividend to General Revenues.

† MST is valid for any number of outward and return journeys in a month.

\*\* Average distance travelled by a passenger in 1980-81 on suburban section was 20.5 kms.



to invest in fares for the whole quarter at a time, RTEC recommended that quarterly season tickets should be rated at 3 times the monthly season ticket. This recommendation is still to be accepted.

## 2.0. Views of Expert Groups.

2.1. The issue of rationalisation of suburban passenger fares has been examined by various Groups of Experts, namely RCC 1973, the Committee on Social Burdens 1979, RTEC 1980 and National Transport Policy Committee 1980 (NTPC). The findings of these bodies are discussed below.

### 2.2. Railway Convention Committee.

2.2.1. RCC 1973 brought out in their Report in October 1975 that it is only as a legacy of the olden company days that the Indian Railways continue to carry this ever-increasing burden, and that a stage has reached when it is no longer possible for them to bear the losses on suburban services. This Committee considered that it would be equitable if the losses on this account are pegged to 1965-66 level—the last year in which the Railways earned a surplus and whatever losses are incurred over and above that level should be borne by the State Governments, local authorities etc., as they are the authorities responsible to provide residential accommodation to their employees near their place of work or in the alternative to provide them suitable transport facilities.

2.2.2. The Committee, realising that a proposal like this bristles with difficulties when the finances of the State Governments and local authorities are none too happy, recommended that the entire question of subsidising the Railways so as to cover unavoidable losses on passenger traffic, suburban as well as non-suburban, should be remitted to a high-powered Committee comprising the representatives of the Ministries of Railways, Transport and Finance, the Comptroller and Auditor General, the State Governments and local authorities concerned. This Committee were to work out a practicable financial arrangement to adequately subsidise the Railways keeping in view the practice in this behalf obtaining in Great Britain, France, West Germany etc.

2.2.3. Simultaneously, RCC emphasised that such a subsidy should in no case absolve the Railways from the need for strict financial discipline and that this cannot be in the nature of a premium on inefficient service.

### 2.3. Committee on Social Burdens §

2.3.1. The Committee on Social Burdens stated in their Report that a study of bus fares in the suburban cities had revealed that neither any reduced monthly season tickets were given by the Road Transport Undertakings nor any reduction in the fares allowed. The bus fares in Bombay were found to be higher than the rail fares, the differential being even higher in the case of Express buses which, speedwise, compared favourably with the fast suburban services.

2.3.2. They recommended that the suburban rail fares should not be less than the bus fares; but as an 'ad hoc and first step' the price of a monthly season ticket should be equal to 24 single journey fares. Realising that it would be difficult to make a one-time increase

in the suburban fares, they recommended that the increase should be progressive and gradual but the entire process should be completed within a period of three years.

2.3.3. The Committee on Social Burdens further recommended that till the Railways are able to push up the season ticket fares to a level at which the cost is fully covered, the loss in operating suburban services should be deducted from the dividend payable to the General Revenues.

### 2.4. Rail Tariff Enquiry Committee.

2.4.1. RTEC had dealt with the question of suburban fares both in their Interim Report (November 1978) and the Main Report (April, 1980).

2.4.2. In their Interim Report they gave two alternatives. In alternative I, they proposed Second class monthly season ticket fare of Rs. 12 for a distance upto 5 kms. which increased to Rs. 101 for the highest slab in the suburban area viz., 141-150 kms. The monthly season ticket fares then in force on the suburban sections were Rs. 3.90 for a distance up to 5 kms. and Rs. 33.60 for the slab 141-150 kms.

2.4.3. The increase suggested in alternative-I was on the assumption that the Government would pass legislation for ensuring reimbursement of a substantial part of the commuters' transport expenses by his employer. If this legislation was not possible and the whole burden was to be borne by the commuter himself, they suggested alternative II, in which the monthly season ticket fare for a distance upto 5 kms. was proposed as Rs. 10 which increased to Rs. 61 for the highest distance slab of 141-150 kms.

2.4.4. The season ticket fares recommended in alternative I and II have been compared with the monthly season ticket fares then prevalent for suburban services, in Table 2.3 (Page).

2.4.5. RTEC had compared the proposed fares with the bus fares in the major urban areas and stated that the fare structure for season tickets proposed by them "should not be considered unreasonable or unduly high".

2.4.6. RTEC had further recommended that the First class season ticket fare should, for all distances, be rated at four times the Second class season ticket fare. As already mentioned, this recommendation has been implemented from 1st April, 1979.

2.4.7. RTEC have argued at length on the degree of concession to be allowed. They stated that while some concession is justified on the ground that the journeys performed, particularly during the peak periods, are far from comfortable, the quantum of concession available was far too high and unique on the Indian Railways. Such a large concession was not extended by any other railway system in the world. They concluded that a concession of not more than 50 percent is the maximum that could be justified, implying that for all distances the monthly season ticket fare should

† Railway Convention Committee (1973)—Ninth Report submitted in October 1975.

\*\*RTEC submitted an Interim Report in November 1978.

This committee was set up in Jan. 78 as per the recommendations of RCC (1973). Ninth report submitted in Oct. 75. The committee gave their report in Jan. 79.



be equal to the fare of 24 or 25 single journeys.† They stated that while such a proposal may not result in a large increase in the short distance fares, for long distances the increase would be pretty high and that it might be difficult to get that accepted. They, therefore, suggested that the Government might consider increasing season ticket fares steadily and bring them to the level suggested in the course of five to ten years.

Table 2.3

## Second class monthly season ticket fares

Distance slab (in kms.)	Proposed Second class MST Fare		Second class MST fare (Suburban*)		
	Alternative I	Alternative II	Bombay	Calcutta	Madras
1	2	3	4	5	6
	Rs. P.	Rs. P.	Rs. P.	Rs. P.	Rs. P.
1-5	12.00	10.00	3.90	3.90	3.90
6-10	17.00	13.00	6.40	6.40	6.40
11-15	22.00	16.00	7.75	7.75	7.75
16-20	27.00	19.00	9.00	9.00	9.00
21-25	31.00	21.00	10.20	10.20	10.65
26-30	35.00	23.00	11.40	11.40	11.95
31-35	39.00	25.00	12.50	12.50	13.10
36-40	43.00	27.00	14.30	14.30	14.30
41-45	47.00	29.00	15.45	15.45	15.45
45-50	51.00	31.00	16.50	17.05	17.05
51-60	56.00	34.00	18.30	19.35	19.35
61-70	61.00	37.00	19.90	21.15	...
71-80	66.00	40.00	21.25	22.95	...
81-90	71.00	43.00	22.50	24.75	...
91-100	76.00	46.00	24.55	26.50	...
101-110	81.00	49.00	26.10	28.15	...
111-120	86.00	52.00	27.65	29.90	...
121-130	91.00	55.00	...	31.35	...
131-140	96.00	58.00	...	33.00	...
141-150	101.00	61.00	...	33.60	...

2.4.8. RTEC also want into the question of a clear distinction between suburban and non-suburban season ticket fares. They found that the issue of season tickets was mostly confined to distances not exceeding 80 kms. This restriction had led to certain anomalies, in fact there was no ban on a person obtaining two season tickets for distances of 80 kms. or less, and thus in effect to have a season ticket for much longer distances. Looking to this and the fact that with increasing speed of trains, it was quite possible for a commuter to commute daily between points as far as 150 kms. apart, RTEC recommended that season tickets should be freely issued in future between any two stations situated at distances not exceeding 150 kms. This recommendation has been implemented from 1 April 1979. The distinction in the season ticket fares between suburban and non-suburban sections upto 150 kms. thus stands abolished.

2.4.9. RTEC also stressed that services on the existing suburban sections were becoming increasingly unsatisfactory and that immediate steps were necessary to improve and expand them. For this purpose, major investments would have to be made and as the season ticket fares would not yield enough revenues to make them fully economical, they recommended that such investments should be altogether except from dividend liability.

## 2.5. National Transport Policy Committee (NTPC).

2.5.1. By the time the matter came up for consideration of NTPC, the Railways had raised their monthly season ticket fares from 1 April 1979, following the Interim Report of RTEC, though the quantum of increase was much less than that recommended by RTEC. NTPC mentioned that a good case existed for a further upward revision of suburban season ticket fares to help the Railways cater to increasing demand for traffic in metropolitan cities and to find a part of the resources for attendant development programmes.

## 3.0. Our observations and recommendations.

3.1. Barring some ad hoc adjustments made between 1962 and 1972, there was no major increase in the Second class suburban season ticket fares from 1949 to 1978. It was only from April 1979, following the consideration of the interim Report of RTEC, that these suburban season ticket fares were marginally enhanced. These were again put up by 15 percent for all distances from 15 July, 1980.

3.2. There was also consequent enhancement in the First class season ticket fares which are priced at 4 times the Second class season ticket fares.

3.3. There was only a marginal change in the season ticket fares in 1981-82 (non in 1982-83) viz., monthly season ticket fares were rounded off to the next 50 paise and quarterly season ticket fares were rounded off to the next 1 rupee with effect from 1st October, 1981.

3.4. The Committee have in Table 2.4 (page) compared the existing monthly season ticket fares with those recommended by RTEC in their Interim Report.

3.5. There has been considerable inflation since the time RTEC gave their Report. The existing season ticket fares should, therefore, have been higher than those recommended by RTEC. But, as would be seen from Table 2.4, they are less (than alternative II) and the position at present is that MST fares is equal to only 6 to 14 single journey fares for Second class and 3 to 5@ single journey fares for First class.

Source : Table No. VIII.5(a)(page 78) of RTEC's Interim Report.

\* These were the fares charged when RTEC gave their Interim Report.

† As per the Survey conducted by RTEC, an overwhelming proportion of season ticket holders use their season tickets for making six or more trips per week. Among the First class season ticket holders about 64% make six trips a week and about 21% make seven or more trips. Among the Second class season ticket holders, 59% make 6 trips a week and 25%

make seven or more trips. The proportion who make only 2 to 5 trips is between 9 and 10%, both Among the First and Second class season ticket holders. Thus, the overwhelming majority of the season ticket holders perform over 50 single journeys per month with the use of the season ticket.

‡ The fares recommended by RTEC in alternative II have been compared as it was decided by the Government not to pass the legislation for reimbursement of part of the cost by the employer.

@ Cf. Table 2.2.



Table 2.4  
Second Class MST fares

Distance slab (Kms.)	Recommended by RTEC in their Interim Report in November, 1978	Existing fares
	Rs. P.	Rs. P.
1—5	10.00	6.50
6—10	13.00	10.00
11—15	16.00	13.00
16—20	19.00	15.00
21—25	21.00	18.00
26—30	23.00	20.00
31—35	25.00	22.00
36—40	27.00	24.00
41—45	29.00	26.00
46—50	31.00	28.00
51—60	34.00	31.00
61—70	37.00	33.50
71—80	40.00	36.50
81—90	43.00	39.00
91—100	46.00	42.00
101—110	49.00	44.50
111—120	52.00	46.00
121—130	55.00	50.00
131—140	58.00	52.50
141—150	61.00	54.50

3.6. Such heavy concessions are not extended by any rail system abroad. Table 2.5 gives the position of UK and Sweden.

Table 2.5  
Position of Railways abroad £

Distance Kms.	No. of single journey fares equivalent to season ticket fare	
	UK	Sweden
5	32	31*
20	31	20
35	24	18**
50	19	16
70	16	14***
90	14	13
110	13	..
130	12	12
150	11	..

3.7. We are concerned to note that though the successive high level Committees appointed in the past had recommended pragmatic increase in suburban season ticket fares, these recommendations have not yet been fully implemented.

£ Source : RTEC Main Report Volume I page 177

\* Relates to 6 km.

\*\* Relates to 30 km.

\*\*\* Relates to 60 km.

Source : Table 10.03, page 177 of RTEC's Main Report Volume I.

3.8. The increases in season ticket fares from 1st April 1979 and from 15th July 1980 have not been able to even contain the old loss, let alone the cascading deficit on this account. The loss even after the raise went up from Rs. 26 crores in 1978-79 to Rs. 31 crores in 1979-80 and to Rs. 34 crores in 1980-81. In 1981-82 the loss is about Rs. 45 crores.

3.9. This is not all. The loss of Rs. 45 crores for 1981-82 has been worked out taking into account the appropriation to DRF at Rs. 350 crores. This appropriation to DRF is for all the Railways put together and only a small fraction of it is included in the working expenses of the suburban section. If the total appropriation to DRF gets increased to Rs. 1,110 crores, as recommended by us in Part IV of our Report, the portion of DRF, which enters into the working expenses for suburban traffic, will correspondingly go up as a result of which the annual loss would increase from Rs. 45 crores to Rs. 85.6 crores†. We have, however, recommended that out of Rs. 1,110 crores an amount of Rs. 260 crores required to liquidate the arrears should be provided by the General Revenues as a subsidy and only the balance amount of Rs. 850 crores should be taken as an element of cost. If this is done, the annual loss from suburban services would broadly be of the order of Rs. 72 crores.

3.10. The Railways after some increase in the suburban season ticket fares in 1979-80 and 1980-81 did not, contrary to the recommendations of the RTEC, make any change in the season ticket fares in 1981-82†† and 1982-83, on the ground that such an increase would not be in the interest of the common man.

3.11. RTEC had taken into account the sociopolitical aspect of the problem and had stated :

"The interest of the common man would be served far better if economic growth can be ensured as well as a better and more efficient functioning of the economic system. This would enable the development of backward regions, better utilization of existing and potential production capacities, and thus create more employment and provide at least a minimum income to the really poor in the country who still constitute almost 40 per cent of the total population. We think that keeping railway tariffs artificially low, thus reducing Railway finances to a poor state, while appearing to be in the interest of the common man, really affects his genuine interest adversely. If the matter is looked at dispassionately and not in terms of populist slogan-mongering, it will be seen that a financially sound railway system is a sine qua non of a healthy and growing economy which is the need of the country and its common people."

We are in agreement with the above view and we also feel that the Government should take urgent action to increase the suburban season ticket fares.

3.12. A broad estimate of additional revenue earning from suburban traffic for various alternatives viz., First and Second class MSTs if priced at 14, 16, 18, 20, 22 and 24 single journeys has been worked out by us. The additional earnings that would accrue from these alternatives are shown in Table 2. 6.

§ Estimated by Railway Board.

† Estimated by Railway Board at our instance.

†† For 1981-82, there was no increase except the rounding off to the next 50 paise in monthly season ticket fare and to the next 1 rupee in quarterly season ticket fare from 1st October, 1981.



Table 2.6

## Additional earnings

Number of journeys in one MST (both First and Second class)	Additional earnings (Rupees in crores)		
	Second class	First class	Total
1	2	3	4
14	15.4	27.0	42.4
16	22.9	32.4	55.3
18	30.3	37.9	68.2
20	37.8	43.3	81.1
22	45.3	48.8	94.1
24	52.8	54.3	107.1

3.13. At present a First class MST is priced at 3 to 5 First class single journey fares for equivalent distance. The survey conducted by RTEC (Cf. page footnote), shows that about 64 per cent of the First class season ticket holders make 6 trips and about 21 per cent make 7 or more trips a week. This means that on an average, the Railways are charging 3 to 5 single journey fares as against 50 to 60 single journeys performed in a month. The element of subsidy in a First class suburban season ticket fare is thus too heavy. RTEC had recommended that the Second class MST should be priced at 24 single journey fares and the First class MST at 4 times the Second class MST fare. While the recommendation of RTEC to price First class MST at 4 times the Second class MST has been implemented, its recommendation in respect of Second class has not so far been implemented. While we are in agreement with the views of RTEC in regard to the Second class MST being charged at 24 times the single journey fare, we also consider that the Railways should not unduly subsidise First class suburban passengers. We are aware of the difficulties that the Railways may have to encounter in the metropolitan areas in revising the commuter fares, recommended. The financial situation, however, is such that there is no option on the part of the Railways but to rationalise the fare structure ; such revisions would have to be faced sooner or later.

3.14. We recommend that while the Second class MST should be charged at 24 times, as recommended by RTEC, the impact of this increase should be reduced so that the Second class MST is priced at 20 times the single journey fare in the next three years in instalments considered realistic by the Government. The residual increase should be effected thereafter. As regards the First class, we recommend that the MST should be charged at 6 times the Second class MST ; the element of concession should obviously be less than what is available for Second class MST. The recommendation of RTEC to price First class MST at 4 times the Second class MST has already been implemented. The residual increase, i.e., from 4 times to 6 times, may be done in realistic instalments during the next three years.

3.14.1. It will be appreciated that we have recommended the implementation of the increase in MST fares in realistic stages. The full impact may take anything between 4 to 6 years, depending on the stage-by-stage implementation by the Railways.

3.14.2. An idea of the generation of additional earnings that would accrue to the system for various stages of enhancement is given in Table 2.7.

Table 2.7  
Additional earnings—First class MST priced at six times the Second class MST

Number of single journeys in Second class MST	Additional earnings (Rupees in crores)		
	Second class	First class	Total
1	2	3	4
14	15.4	12.3	27.7
16	22.9	15.7	38.6
18	30.3	19.0	49.3
20	37.8	22.4	60.2
22	45.3	25.8	71.1
24	52.8	29.2	82.0

Thus when the full implementation of our recommendation has been made, additional earnings of Rs. 82 crores would have been generated and would only then cover the suburban loss.

3.15. Since at present there is no distinction upto 150 kms. in the MST fares, whether the passengers are carried on the suburban section or on the non-suburban section, the recommendations made for suburban traffic would equally apply to the non-suburban section. The additional earnings that would accrue from the MSTs issued on the non-suburban section for the various alternatives are given in Table 2.8.

Table 2.8  
Additional earnings—non-suburban MSTs\*

Number of single journeys in Second class MST (First class MST priced at six times the Second class MST)	Additional earnings (Rupees in crores)		
	Second class	First class	Total
1	2	3	4
14	8.9	3.4	12.3
16	12.2	4.0	16.2
18	15.1	4.6	19.7
20	18.6	5.3	23.9
22	21.7	5.9	27.6
24	25.0	6.5	31.5

3.16. After pricing the Second class MST at 24 single journey fares, the Railways would still be giving a 50 per cent concession in view of the fact that there are 24 working days in a month and a minimum of 48 journeys would be performed by a commuter. Both RTEC and the Committee on Social Burdens have recommended this level of enhancement. Furthermore, the Railways have already correctly accepted this principle in the case of Delhi Metropolitan Transport, and this principle should now be logically extended to other suburban cities.

3.17. RTEC has recommended that quarterly season tickets should be charged as three times the MST fare. We feel that there should be an incentive for commuters

\* Cf. Annexure A-2.2,

† Cf. Annexure A-2.2,

\* Cf. A-2.2. These additional earnings would reduce the losses on passenger traffic on the non-suburban sections.



to shift from the purchase of monthly to quarterly season tickets. For this, the Railways may charge quarterly season tickets at three times the MST but should give a 10 per cent rebate. This will also be administratively convenience to the Railways.

3.18. We have compared in Table 2.9 the existing MST fares with those proposed by us viz., a Second class MST being priced at 24 times the single journey fares and a First class MST at six times the corresponding Second class MST.

Table 2.9  
MST fares—existing and proposed

Distance slab (kms.)	Existing fares		Proposed fares	
	Second class MST	First class MST	Second class MST	First class MST
1	2	3	4	5
	Rs. P.	Rs. P.	Rs. P.	Rs. P.
1—5	6.50	26.00	16.80	103.80
6—10	10.00	40.00	16.80	109.80
11—15	13.00	52.00	21.60	129.60
16—20	15.00	60.00	26.40	158.40
21—25	18.00	72.20	31.20	187.20
26—30	20.00	80.00	45.60	273.60
31—35	22.00	88.00	52.80	316.80
36—40	24.00	96.00	60.00	360.00
41—45	26.00	104.00	64.80	388.80
46—50	28.00	112.00	67.20	403.20
51—60	31.00	124.00	88.80	532.80
61—70	33.50	134.00	98.40	590.40
71—80	36.50	146.00	110.40	662.40
81—90	39.00	156.00	124.80	748.80
91—100	42.00	168.00	132.00	792.00
101—110	44.50	178.00	151.20	907.20
111—120	46.50	186.00	163.20	979.20
121—130	50.00	200.00	177.60	1,065.60
131—140	52.50	210.00	187.20	1,123.20
141—150	54.50	218.00	194.40	1,166.40

3.19. The average distance travelled by a suburban passenger is about 20 kms. From Table 2.9 read with Annexure A-2.1 it is evident that the consequential increase in MST fare in the basic commuter zone is not high.

3.20. 19.7 per cent, i.e. nearly one-fifth of the total passenger kilometres carried in 1980-81, were on suburban sections. In absolute terms, passenger kilometres carried on the suburban section were 41.09 billions out of a total of 208.56 billions.†† Further, 67 per cent†† of the journeys performed on the suburban services were by season ticket holders. We consider that it would not be in the interest of railway finances to so heavily subsidise such a large chunk of their passenger traffic or to pass on the burden to the rest of the passengers who are none the richer.

3.21. In view of the continuing price increase we do not consider it advisable to stick to the time-frame of five to ten years suggested by RTEC to raise the season ticket fares to a level of 25 single journeys in a MST. This time-frame to us appears to be too long and the Railways can ill-afford to carry such a heavy burden for so long.

3.22. We recommend that the Railways should take steps to increase the suburban season ticket fares to the level suggested by us in phases already recommended (Cf. paragraphs 3.14 and 3.14.1 ante).

3.23. In Part II of our Report, we have estimated that by the turn of the century, the suburban traffic will be around 120 billion passenger kilometres. In addition, on the non-suburban sections, the suburban-like traffic by 2000 AD would be about 40 billion passenger kilometres. The increase in the suburban traffic from the present level† will thus be phenomenal and unless the season ticket fares are equitably increased, the losses will be colossal and it will be impossible for the Railways to bear the financial strain. Unless bold and imaginative steps are taken to forestall such a situation, the entire structure of commuter services may virtually collapse.

3.24. We have noted that whenever an increase takes place in a single journey fare, corresponding increase does not take place in MST fares. It is this wrong practice that has resulted in the concession element in MST getting larger and larger from year to year. We recommend that this practice should now cease altogether and that whenever single journey fares are revised, corresponding adjustments in MST fares should also be made.

#### 4.0. Conclusions.

4.1. It is unfair that the Railways should have to bear the heavy financial burden resulting from concessional suburban fares on behalf of public and private undertakings in the major metropolitan cities.

4.2. The anomaly of the situation is heightened by the fact that no part of the subsidy is presently shared by any State Government or other Undertakings either in the Public or Private sectors.

4.3. As has been correctly pointed out by the Committee on Social Burdens, the low suburban fares have resulted not merely in a serious financial loss to the Railways but also in unplanned growth of urban centres in the country and consequent hardships in matter relating to housing and sanitation, education and cultural development, ecology and environment and even in law and order situation.

4.4. The present so called socio-economic justification offered in favour of the extremely low suburban season ticket fares, therefore, is no more valid.

4.5. A Second class MST fare should be equal to 24 times the single journey fare.

4.6. A First class MST should be priced at six times the Second class MST.

4.7. A quarterly season ticket should be priced at three times the MST, with a 10 per cent rebate.

4.8. Whenever an increase takes place in the single journey fare, corresponding increase should simultaneously take place in the MST fares.

4.9. In the first instance the proposed increase in Second class MST fare should be done only upto 20 times the single journey fare as against 24 times recommended by RTEC, within the next three years, in stages considered realistic by the Railways. The residual increase from 21 to 24 times should be done in subsequent years.

4.10. As for First class MST, RTEC's recommendation to compute it at 4 times the Second class MST has already been implemented. The remaining increase should be brought about within the next three years.

††Source Page 52 109 of Indian Railways year book 1980-81.

† In 1980-81, passenger Kilometres carried on Suburban sections

were 41.1 billions. In addition, Suburban-like traffic on non-suburban sections was 15.5 billion passenger Kilometres. (Cf Tables 1.4 and 1.8 of Part II of our Report).



## Equivalent number of single journeys fares and number of MSTs issued in 1980-81

Distance (Kms.)	Existing single journey passenger fares			Distance Slab (kms.)	Number of MST* issued in 1980-81 (in million)			
	First class	Second class ordinary	Ratio of First class to Second class ordinary		Suburban		Non-suburban	
					Second	First	Second	First
1	2	3	4	5	6	7	8	9
	Rs. P.	Rs. P.						
5	8.00	0.70	11	1—5	3.015	0.091	0.249	0.004
10	10.00	0.80	12	6—10	4.327	0.447	0.759	0.010
15	10.00	1.00	10	11—15	3.863	0.299	0.828	0.018
20	13.00	1.20	11	16—20	3.552	0.317	0.739	0.024
25	13.00	1.30	10	21—25	2.886	0.253	0.680	0.008
30	19.00	1.90	10	26—35	4.229	0.424	0.923	0.031
35	19.00	2.30	8	36—49	1.516	0.080	0.817	0.019
40	21.00	2.50	8	50—80	1.228	0.066	0.938	0.027
45	21.00	2.80	7	81 and above	0.155	0.003	0.612	0.031
50	24.00	3.20	7					
55	26.00	3.60	7					
60	27.00	3.80	7					
65	27.00	4.10	7					
70	30.00	4.40	7					
75	32.00	4.50	7					
80	33.00	4.80	7					
85	35.00	5.10	7					
90	37.00	5.30	7					
95	37.00	5.50	7					
100	39.00	5.70	7					
105	40.00	6.30	6					
110	43.00	6.60	7					
115	43.00	6.80	6					
120	44.00	7.00	6					
125	44.00	7.10	6					
130	46.00	6.40	6					
135	46.00	7.70	6					
140	48.00	8.00	6					
145	48.00	8.10	6					
150	49.00	8.40	6					

Distance slab (Kms.)	Existing single journey passenger fares**		MST Fares at 14 times single journey fares		Earnings† (Rs. in millions)			
	Second Class	First Class	Second Class	First Class	Suburban		Non-suburban	
					Second Class	First Class	Second Class	First Class
1	2	3	4	5	6	7	8	9
	Rs.P.	Rs.P.	Rs.P.	Rs.P.				
1-5	0.70	8.00	9.80	112.00	29.55	10.19	2.44	0.45
6-10	0.70	8.00	9.80	112.00	42.40	50.06	7.44	1.12
11-15	0.90	10.00	12.60	140.00	48.67	41.86	10.43	2.52
16-20	1.10	12.00	15.40	168.00	54.70	53.26	11.38	4.03
21-25	1.30	13.00	18.20	182.00	52.52	46.05	12.38	1.46
26-35	2.10	19.00	29.40	266.00	124.33	112.78	27.14	8.25
36-49	2.70	21.00	37.80	294.00	57.30	23.52	30.88	5.59
50-80	4.10	27.00	57.40	378.00	74.50	24.95	53.84	10.21
81 and above	6.80	44.00	95.20	616.00	14.76	1.85	58.26	19.10
Total (Rupees in millions)					498.73	364.52	214.19	52.73
Total (Rupees in crores)					49.8	36.4	21.4	5.3

\* Source : Passenger Done Statistics for 1980-81 (originating journeys have been divided by 50 to get the number of MSTs).

\*\* Fares for Second and First classes have been taken at the mid-points of the distance slabs. The slabs 81 and above has been taken as 81-150 Kms.

† Number of MSTs issued in 1980-81 multiplied by corresponding MST fare. Number of MSTs are shown in Columns 6 to 9.



**Earnings from First class if MST First class is taken as 4 times the Second class MST (14 journeys)**

Distance slab (Kms.)	MST fare† for First class if taken as 4 times Second class MST fare (14 single journeys)			Earnings (Rupees in (millions))	
				First class suburban †	First class non-suburban ††
1	2			3	4
	Rs. P.			Rs. P.	Rs. P.
1—5	..	..	..	39.20	3.6
6—10	..	..	..	39.20	17.5
11—15	..	..	..	50.40	15.1
16—20	..	..	..	61.60	19.5
21—25	..	..	..	72.80	18.4
26—35	..	..	..	117.60	49.9
36—49	..	..	..	151.20	12.1
50—80	..	..	..	229.60	15.1
81 and above	..	..	..	380.80	1.1
Total (Rupees in Millions)				152.3	28.04
Total (Rupees in (crores))				15.2	2.8

*Annexure 2.2A*  
(Cf. paras 3.12, 3.14.2 and 3.15)

**Earnings from suburban season tickets for various alternatives\***

(Rupees in crores)

Category	Existing earnings from MSTs*	Interim Proposal of RTEC **	14 single journeys in MSTs (both for First and Second classes) †	14 single journeys in Second class MST and First class MST = 4 times the Second class MST. †	16 single journeys in MSTs (both for First and Second classes) ‡	16 single journeys in Second class MST and First class MST = 4 times the Second class MST. ‡	18 single journeys in MSTs (both for First and Second classes) §	18 single journeys in Second class MST and First class MST = 4 times the Second class MST. §	20 single journeys in MSTs (both for First and Second classes) ¶	20 single journeys in Second class MST and First class MST = 4 times the Second class MST. ¶	22 single journeys in MSTs (both for First and Second classes) ¤	22 single journeys in Second class MST and First class MST = 4 times the Second class MST. ¤	24 single journeys in MSTs (both for First and Second classes) &	24 single journeys in Second class MST and First class MST = 4 times the Second class MST. &
<b>Suburban</b>														
First class	10.7	12.1	36.4	15.2	41.6	17.4	46.8	19.5	52.0	21.7	57.2	23.9	62.4	26.1
Second class	35.1	47.6	49.8	49.8	56.9	56.9	64.0	64.0	71.1	71.1	78.2	78.2	85.4	85.4
Total	45.8	59.7	86.2	65.0	98.5	74.3	110.8	83.5	123.1	92.8	135.4	102.1	147.8	111.5
<b>Additional earnings for various alternatives :</b>														
First class		1.4	25.7	4.5	30.9	6.7	36.1	8.8	41.3	11.0	46.5	13.2	51.7	15.4
Add 5% †		0.1	1.3	0.2	1.5	0.3	1.8	0.4	2.0	0.6	2.3	0.7	2.6	0.8
Second class		12.5	14.7	14.7	21.8	21.8	28.9	28.9	36.0	36.0	43.1	43.1	50.3	50.3
Add 5% ‡		0.6	0.7	0.7	1.1	1.1	1.4	1.4	1.8	1.8	2.2	2.2	2.5	2.5
Total		14.6	42.4	20.1	55.3	29.9	68.2	39.5	81.1	49.4	94.1	59.2	107.1	69.0
<b>If First class MST is priced as six times the second class MST, additional earning would be :</b>				7.6	8.7		9.8		10.8		11.9			13.0
Total				27.7††	38.6		49.3		60.2		71.1			82.0

† Col. (4) of page 283 A × 4.

† Col. (2) of this table × Col. (7) of page 283.

†† Col. (2) of this table × Col. (9) of page 283.

\* Source : Passenger Zone Statistics for 1980-81. The earnings would increase slightly due to the rounding off of season ticket fares from 1st October, 1981.

\*\* Number of MSTs issued in 1980-81 have been multiplied by the fares proposed for the corresponding distance slabs by RTEC in their Interim Report under alternative II.

@ Brought forward from page 283.

‡ The earnings for various alternatives in columns 6 to 15 have been worked out by proportionately increasing the earnings for the alternatives shown in columns 4 and 5. For instance, earnings for First class for the alternative when a MST includes 16 single journeys fares (both First and Second Class)

$$\frac{36.4 \times 16}{14} = 41.6$$

†† Earning for First class  $4.5 \div 0.2 \div 7.6$  ... 12.3  
Earning for Second class  $14.7 \div 0.7$  ... 15.4

Total : 27.7

The break up for other alternatives can be worked out in the same manner.



## Earnings from non-suburban season tickets for various alternatives\*

(Rupees in Crores)

Category	Existing earnings from MSTs	Interim Proposal of RTEC	14 single journeys in MSTs (both for First and Second classes)	14 single journeys in Second class MST and First class MST = 4 times the Second class MST.	16 single journeys in MSTs (both for First and Second classes).	16 single journeys in Second class MST and First class MST = 4 times the Second class MST	18 single journeys in MSTs (both for First and Second classes).	18 single journeys in Second class MST and First class MST = 4 times the Second class MST	20 single journeys in MSTs (both for First and Second classes).	20 single journeys in Second class MST and First class MST = 4 times the Second class MST.	22 single journeys in MSTs (both for First and Second classes).	22 single journeys in Second class MST and First class MST = 4 times the Second class MST.	24 single journeys in MSTs (for both First and Second classes).	24 single journeys in Second class MST and First class MST = 4 times the Second class MST.
Non-Suburban :														
First class	0.9	2.0	5.3	2.8	6.1	3.2	6.8	3.6	7.6	4.0	8.3	4.4	9.1	4.8
Second class	12.9	16.5	21.4	21.4	24.5	24.5	27.5	27.5	30.6	30.6	33.6	33.6	36.7	36.7
Total	13.8	18.5	26.7	24.2	30.6	27.7	34.3	31.1	38.2	34.6	41.9	38.0	45.8	41.5
Additional earnings for various alternatives :														
First class		1.1	4.4	1.9	5.2	2.3	5.9	2.7	6.7	-3.1	7.4	3.5	8.2	3.9
add- 5%§		0.1	0.2	0.1	0.3	0.1	0.3	0.1	0.3	0.2	0.4	0.2	0.4	0.2
Second class		2.6	8.5	8.5	11.6	11.6	14.4	14.4	17.7	17.7	20.7	20.7	23.8	23.8
Add 5% §		0.1	0.4	0.4	0.6	0.6	0.7	0.7	0.9	0.9	1.0	1.0	1.2	1.2
Total		3.9	13.5	10.9	17.7	14.6	21.3	17.9	25.6	21.9	29.5	25.4	33.6	29.1
If First class MST is priced as six times the Second class MST, additional earnings would be.				1.4	1.6		1.8		2.0		2.2			2.4
Total				12.3	16.2		19.7		23.9		27.6			31.5

\* Cf. footnotes on the statement showing earning from suburban season tickets for various alternatives at page 44 of this Annexure. The same would apply here mutatis mutandis.

§ 5% has been added for increase in traffic to bring it to the 1981-82 level. This has been done as additional earnings are being compared with the losses in 1981-82.



सत्यमेव जयते



## CHAPTER III

### NON SUBURBAN FARES

#### 1. Introduction.

1.1. The passenger traffic on the Railways has been growing steadily over the years. The annual rate of growth during the three decades from 1950-51 to 1980-81 in passenger kilometres has been roughly 6 per cent. The total number of passengers carried in 1980-81 were 3.6 billion out of whom 1.6 billion were non-suburban. In terms of passenger kilometres, the Railways in 1980-81

carried 208 billion passenger kilometres including 167 billion passenger kilometres on the non-suburban section. On an average, the distance travelled by a suburban passenger in 1980-81 was 20.5 kms. and that by a non-suburban passenger 103.9 kms.

1.2. Table 3.1 gives the profile of growth in non-suburban passenger traffic.

Table 3.1

**Growth of non-suburban passenger traffic**

year	Number of passengers originating (in millions)				Passenger kms. (in millions)			
	Upper	Second Mail/Express	Second Ordinary	Total	Upper	Second Mail/Express	Second Ordinary	Total
1950-51	25	52	795	872	3.790	12.537	43.639	59.966
1955-56	15	76	689	780	2.973	15.660	35.640	54.273
1960-61	15	96	803	914	3.454	22.251	40.190	65.895
1965-66	17	125	922	1,064	4.220	28.997	45.913	79.130
1968-69	16	139	974	1,129	3.978	33.546	49.902	87.426
1973-74	11	188	1,018	1,217	4.328	49.642	53.657	107.627
1976-77	7	188	1,303	1,498	3.628	57.731	65.395	126.754
1977-78	8	209	1,359	1,576	3.977	65.500	67.724	137.201
1978-79	9	230	1,367	1,506	4.446	74.405	70.655	149.506
1979-80	9	247	1,346	1,602	4.760	81.115	74.055	159.927
1980-81	10	260	1,342	1,612	5.140	86.712	75.620	167.472

1.3. In Part II of our Report, we have estimated that there would be a substantial growth in the development of rail-borne passenger traffic and that by the turn of the century, the non-suburban traffic would be of the order of 280 billion passenger kilometres and the suburban traffic 160 billion passenger kilometres\*. For the Railways to provide a safe and efficient mode of transport to carry such a large volume of traffic, it is essential that their fare structure has a rationale and is cost-based.

1.4. The existing fare structure has been subjected to ad hoc changes and aberrations† in the past. Some instances are :

1. Third class†† was exempted from the overall increase in passenger fares in April, 1972.
2. In April, 1973 and September 1974, Third class passengers travelling upto 15 and 25 kilometres respectively were exempted from fare increase.
3. In 1980-81, there was no change in the Second ordinary fares upto 100 kms.
4. In 1981-82, the fares for Second class ordinary up to 200 kms. remained unchanged.
5. In 1982-83, the fares were only rounded off to the next higher multiple of 10 paise for Second class ordinary upto 200 kms. and 50 paise for beyond 200 kms., 50 paise for Second class Mail/Express and Rupee one for the remaining classes.

1.5. It is clear to the Committee that the existing fare structure does not have an orientation to the cost-structure. We have already brought out in Chapter-I that the fares have not been rationalised in consonance with the increasing cost of inputs required by the Railways. While there has been rapid inflation in the cost of staff, fuel and other materials that go into the production of rail transport, the fares have gone up only in dribbles. The Railways continue to incur heavy losses on their slow moving passenger trains, and those that are run on the numerous uneconomic branch lines. These losses are partly offset by the profits from Mail/Express services but on the whole the passenger business has become a losing activity, *inter alia*, in view of an uneconomic fare structure.

1.6. The overall losses\*\* suffered by the Railways on the coaching services†† are shown in Table 3.2.

Table 3.2

#### Losses

Year	(Rupees in Crores)§§
1976-77	108.1
1977-78	85.6
1978-79	131.8
1979-80	193.5
1980-81	253.1

Source : Indian Railways Year Book—1980-81.

\* Cf. paras 5.3 and 6.8 of Chapter I of Part II of RRC's Report. The 160 billion passenger kilometres include 40 billion suburban like traffic (not included in suburban figures).

† These have been listed in detail by RTEC in their Main Report, Volume I.

†† From 1st April 1947, Second class was abolished and the Third class was named as Second class.

\*\* These would have been much higher if adequate provisions were made for renewal and replacement.

‡ Including parcels, luggage and catering but excluding EMU services.

§§ Source : A cost analysis conducted by the Directorate of Statistics and Economics, Railway Board.



## 2.0. Approach to the problem : RTEC.

2.1. The Resolution setting up RTEC clearly indicated the need for rationalisation of the tariff policy *vis-a-vis* the cost of services provided by the Railways. The costing of railway service is mainly based on a system of analysing the fully distributed costs. Under this system, the total expenses incurred by the Railways are allocated to various services and the unit costs worked out. There is no machinery available to know the wasteful or the unjustifiable expenditure in different parts of the system.

2.2. This was recognised by RTEC who indicated that for purposes of management and pricing of railway services, what is needed is a system of standard cost which would indicate, at a level of prices of different inputs and with a given technology, what costs it is necessary to incur if certain outputs are to be obtained. Since such standard costing has not made any headway on the Railways, the only alternative available for RTEC was to base their tariff structure on the performance of an year when the Railways attained some of the best results in terms of efficiency. The physical as well as financial performance of the Indian Railways for the year 1976-77 was by far one of the best. It also happened that the latest cost analysis prepared by the Railway Board was available for this year. RTEC, therefore, took 1976-77 as the base year. The rail tariffs proposed by them were such that if the Railways operated at efficiency parameters of 1976-77, they would meet all their appropriate costs at 1980-81 prices and earn a return of 10 per cent on the Capital-at-charge. This implied that if the Railways showed less efficiency, or carried less traffic, they would earn less. But if they showed higher efficiency and/or carried larger traffic, they would earn more.

2.3. The actual expenditure for 1976-77 was adjusted by RTEC to the year 1980-81 taking into account the following :

1. Ordinary Working Expenses were increased by 28.81 per cent (This price escalation was worked out by the Railway Board at the instance of RTEC).
2. An additional amount of Rs. 10 crores was provided to take care of the inadequacies in repairs and maintenance. This amount was estimated on the consideration that in 1976-77 the gap between demands put forward by the Zonal Railways and the Budget provision made was about Rs. 7 crores.
3. The appropriation to DRF was enhanced from Rs. 135 crores to Rs. 237.45 crores on the basis that provision for depreciation should be made at 4.7 per cent of the block value\* of these assets (investment) as at the end of 1975-76.
4. Appropriation to Pension Fund was enhanced by Rs. 13.84 crores to take care of the liberalisations in the Pension Scheme.
5. Net surplus together with the amount of dividend was so fixed as to give a return of 10 per cent capital-at-charge as on 31 March, 1977.

Table 3.3 gives the item-wise estimate† of additional expenditure/provisions at the 1980-81 price level.

Table 3.3

Estimate of additional expenditure at 1980-81 prices (Rupees in crores)		
Items		Amount
1. Price escalation ..		484.19
2. Repairs and Maintenance ..		10.00
3. Depreciation Reserve Fund ..		102.47
4. Pension Fund ..		13.84
5. Appropriate return ..		157.08
6. Total ..		767.58
or, say ..		770.00

2.4. The Railways had thus to earn Rs. 770 crores more through tariff adjustments. Having regard to the past trend of earnings from goods traffic *vis-a-vis* coaching traffic, RTEC concluded that out of the additional earnings of Rs. 770 crores, goods traffic should contribute around Rs. 500 crores and coaching traffic over Rs. 250 crores.

2.5. In the case of passenger services, the approach of RTEC was that "while revenue from ordinary train passengers should cover variable and dependent costs of these services, revenue from the Mail/Express services should not only cover their fully distributed costs but also make up the short-fall (between the fully distributed costs and the revenue) in ordinary services, so that passenger services become self-supporting, *i.e.*, meet their fully distributed costs at least when they are taken as a whole". With this in mind, the fare levels for different categories of passengers were fixed by them on considerations of cost, standard of comfort and the ability of the passenger to pay the fare.

2.6. It was recognised by RTEC that the short distance passenger traffic can be conveniently and more economically carried by road. Fare policy was, therefore, designed by them so 'as to prevent artificial transfer of such short distance traffic to the Railways'. This they achieved by proposing rates for Second ordinary class travel at rates comparable to those charged by the State Road Transport Corporations.

2.7. RTEC had fixed the fare for the Second class ordinary (which is the lowest class) as the norm. Fares for all other classes were expressed as a percentage of this class. The advantage of this approach was that it would make the revision of fares easier and would also ensure that fares for the various classes/categories of travel would have the intended relationship with each other at all distances.

2.8. The State Road Transport Corporations were generally charging a rate of 5 paise per passenger km. for ordinary bus services. To encourage short distance travel by road, RTEC recommended that the basic rate for Second class ordinary should be 5 paise per km.

2.9. It is a long-standing practice on the Railways to reduce the fare per km. as the length of the journey increases. This practice is consistent with the cost structure. Tapering also ensures that the fare at longer distances is not unbearable. The pattern of taper recommended by RTEC for all classes of travel is shown in Table 3.4.

\* The preparation of the Block Account started with effect from 1st April, 1950 to give the value of physical assets, whether financed from loan capital or revenue. The Block Account records the original value of assets financed from Capital, Development Fund, Accident Compensation, Safety and Passenger Amenities Fund, Open Line Works Revenue, as also the improvement element of the assets replaced at the cost of DRF.

† Cf. Annexure A-3.1.

@ It is an essential principle of railway tariffs all over the world that the increase in fare or freight is done on a telescopic basis, and not in direct proportion to the distance covered. This is referred to as 'taper'. The theoretical rationale for such taper appears later in para 4 of Chapter IV.



Table 3.4

## Pattern of taper in passenger travel

Slab	Taper
1 to 150 kms.	100% of the basic rate
Plus 151 to 400 kms.	80% of the basic rate
Plus 401 to 750 kms.	65% of the basic rate
Plus 751 to 1,200 kms.	55% of the basic rate
Plus 1,201 kms. onwards	50% of the basic rate

2.10. RTEC further suggested that a fixed charge of 25 paise should be added to the Second class ordinary fare, as otherwise for short journeys the fare would not cover even the cost of ticket issue and collection, leave alone other terminal costs.

2.11. The basic scale i.e. the scale of fares for the Second class ordinary, as recommended by RTEC, was thus shown in Table 3.5.

Table 3.5

## Basic scale of fares

	Distance	Second class ordinary
	Zero km. *	25 paise (fixed charge)
Plus	1 to 150 kms.	5 paise per km.
Plus	151 to 400 kms.	4 paise per km.
Plus	401 to 750 kms.	3.25 paise per km.
Plus	751 to 1,200 kms.	2.75 paise per km.
Plus over	1,200 kms.	2.50 paise per Km.

2.12. For the remaining classes of travel, RTEC proposed that the fares should be fixed on the basis of the indices shown in Table 3.6 with the Second ordinary fare scale (basic scale) being equal to 100.

Table 3.6

## Indices

Class	Non-suburban		
	Ordinary	Ordinary	Mail/Express
Second class	..	100	140
A.C. chair car	..	..	300
First class	..	400	500
A.C.C.	..	..	100

In suggesting these indices, RTEC took into account not only the cost of a particular service, but also other relevant factors, such as differences in the standards of comfort provided and the ability of the passengers to pay the fares. For instance, while the unit cost per passenger kilometre for Second ordinary was higher than that for Mail/Express, the fare for Second class Mail/Express was recommended to be 40 per cent higher than the Second ordinary fare. This was on the consideration that Mail/Express trains generally get precedence over ordinary trains, have higher speeds and have newer and better maintained coaches.

## 3.0. Tariff escalation recommended by RTEC.

3.1. RTEC were keen to ensure that the finances of the Railways are not put in difficulties as a result of their tariff rates 'being sticky while the prices of their inputs rapidly increase.' They suggested a detailed formula for escalation in future years. This formula provided for adjustments in tariffs due to increases in the cost of staff, fuel and other stores and material. RTEC presumed that working expenses excluding contribution to DRF and dividend formed about 80 percent of the total expenditure and hence it was proper to allow tariff escalation only on this part of the expenditure. They also recommended that the basic tariff rate-Second class ordinary passenger fare at 100 kms. should be escalated at least once a year. The passenger fares for other classes and distances, being related to the basic tariff rate in the form of an index, would get automatically revised.

## 4.0. Appropriate level of fares for 1983-84.

4.1. We have noted that the non-suburban passenger fares have not been raised every year on the basis of the escalation formula suggested by RTEC. As a result, a considerable leeway will now have to be made up, and the Government may find it difficult to do so by raising fares in one shot. We recommend that in further there should be no reluctance on the part of the Government to make justifiable increase in fares every year.

4.2. We have attempted to assess hereinafter what should be the quantum of increase in the non-suburban passenger fares during 1983-84. In this exercise the Committee, like RTEC, have taken 1976-77 as the base year. This year has been chosen as the latest statistics about the financial and operational performance of the Railways, were available up to 1980-81 and till then 1976-77 continued to be one of the best years of performance. The working expenses for 1976-77 have been first adjusted by us to the year 1980-81 on the basis of actual price indices now available and then projected for 1983-84.

4.3. We have kept in view the escalation formula suggested by RTEC, but have considered it necessary to make some important changes in the said formula.

4.4. RTEC had presumed that appropriation to DRF should be worked out at 4.7 per cent of the block value of assets as on 31 March, 1976. In Part IV of our Report, submitted to the Government in November 1982, we have clearly indicated that the contribution to DRF at this level would be totally inadequate and unrealistic. On the basis of the methodology outlined by us in Part IV of our Report, the appropriation to DRF on the value of assets as on 31 March, 1976 works out to Rs. 775.0 crores. ‡

4.5. The amount of Rs. 3,000 crores required to liquidate the past arrears has not been taken by us as an element of cost for revision of fares and freight. As we have already mentioned in Part IV of our Report, this is justified on the ground that the past inadequate appropriations to DRF, which had resulted in the accumulation of such arrears, should not impose a penalty on the current users of rail transport. Instead of recovering this amount by raising fares and freight, it is justifiable that a subsidy to tide over this backlog is provided by the General Revenues.

\*no In some cases the journey may be so short that the fare would cover even the cost of terminal services. As such a fixed charge of 25 paise is added to the Second class ordinary fare at each distance stage. The Second class ordinary scale of fares

this starts with 25 paise at zero kilometre and then increases at the appropriate rate with increase in the distance.

‡ Cf. Annexure A-3.2.

§ Cf. Annexure A-3.3



4.6. The prices of material required for renewal and replacement as well as the wages of staff have continued to rise unabatedly. It would be against this trend of inflation to assume that the contribution to DRF should remain static. We have, therefore, unlike the RTEC, provided for a rough escalation of 10 per cent per annum to arrive at the amount of DRF to be included in the pricing structure itself.

4.7. The appropriation to Pension Fund in 1982-83 was Rs. 150 crores. We have kept the same provision for 1983-84, pending the next assessment to be made by the Government Actuary, which is currently being conducted.

4.8. Table 3.7 gives the adjusted expenditure for 1983-84 worked out by us *vis-a-vis* the adjusted expenditure for 1980-81 worked out by RTEC.

Table 3.7

## Adjusted Expenditure

(Rupees in crores)

Particulars	Adjusted expenditure for 1980-81 worked out by RTEC	Adjusted expenditure for 1983-84 worked out by RRC
1. Ordinary working expenses.	2,032.94	2,866.30*
2. Additional repairs & maintenance expenditure.	10.00	10.00
3. Depreciation provision	237.47	775.00
4. Pension provision	48.24	150.00
5. Net miscellaneous expenditure.	21.67	21.67
6. Return	453.37**	453.37
7. Total	2,803.69	4,276.34

4.9. The increase in expenditure in 1983-84 over that in 1980-81 is thus about 50 per cent).† It is this increase which will have to be made good by appropriate tariff adjustment. For this, the basic rate would have to be enhanced by 50 percent, in which case the revised basic scale would be as shown.

Table 3.8

## Proposed basic scale of fares (Second class ordinary)

Distance slab	Fare
Zero Km.	40 paise (fixed charge)
plus 1 to 150 kms.	7.50 paise per km.
plus 151 to 400 kms.	6.00 paise per km.
plus 401 to 750 kms.	4.87 paise per km.
plus 751 to 1,200 kms.	4.12 paise per km.
plus over 1,200 kms.	3.75 paise per km.

\* Cf. Annexure A-3.4.

\*\* Return at 10% on Capital-at-charge which includes payment of dividend (Rs. 209.05 crores). The Capital-at-charge as on 31 March, 1977 was Rs. 4,533.7 crores.

1.276.32803.7 × 100

2803.7 = 52.5 percent or, say 50 percent.

The passenger fares for other classes and distances will get automatically revised.

4.10. Referring to Table 3.7, Justice H.C.P. Tripathi mentioned that the provisions for certain Items like Pension Fund are almost three times the corresponding provisions made by RTEC. He felt that this escalation was too high. Justice Tripathi was of the view that the suburban fares should be increased only by 15 per cent, to be spread over three years, and that no upward revision should be made in the non-suburban fares.

4.10.1. The Ordinary Working Expenses have been escalated by us by 32.5 per cent for the interregnum 1980-81 to 1983-84, which is considered realistic. The depreciation provision has been stepped up by us from Rs. 237.4 crores to Rs. 775 crores. This has been done as the provisions made by RTEC at 4.7 per cent of the block value of assets was considered inadequate; we have followed the methodology outlined in Part IV of our Report. As regards Pension Fund, the same stands short-contributed because the Railways, as pointed out by us in Part IV of our Report, have not been making appropriations to it in accordance with the actuarial advice. Besides, the Railways themselves have appropriated a sum of Rs. 150 crores in 1982-83. In the light of this position, the Pension provision has been stepped up from Rs. 48.24 crores, provided by RTEC, to Rs. 150 crores.

4.10.2. The above position was explained to Justice Tripathi and the points raised by him considered by the Committee. It was felt that the rationalisation of the fare structure, as recommended in this Report, is overdue and should not be delayed, as otherwise it would have deleterious repercussions in the future of the Railway system. Justice Tripathi, however, did not agree and wanted his views to be placed on record.

4.11. The bus fares charged by some of the State Road Transport Corporations† are given in Table 3.9.

Table 3.9

## Bus fares

State	Basic bus fare (In paise per passenger km.)
Tamil Nadu	7.5
Gujarat	8.3
Karnataka	7.7
Andhra Pradesh	8.0
Madhya Pradesh	7.5‡
Punjab	3.9 to 11.84††

† We had written to the various States, and have compiled table on the basis of replies received.

‡ This is the rate for metalled road. In the case of non-metalled road, the rate is 9 paise per passenger kilometre.

†† The rates vary depending upon whether the road is metalled or not and whether the area traversed is hilly or otherwise. Full rate per km. per 40 kg. is charged for passengers. These rates have been in vogue since 1980.



4.11.1. The proposed basic rate of 7.5 paise per kilometre is comparable with the basic bus fare charged for ordinary bus services by the State Road Transport Corporations. A similar position existed when RTEC recommended a basic rate of 5 paise per kilometre. At that time most of the State Transport Corporations used to charge a rate of 5 paise per passenger kilometre for ordinary bus services. Once the two rates *i.e.*, the bus fare and the rail fare are comparable, the short distance traffic would tend to move by road, the convenient mode for short-distance travel. This would be in line with the approach enunciated by us in Part II of our Report that further proliferation of stopping sectional passenger trains should be halted and that their frequency gradually reduced.

4.12. The latest year for which the Railways have worked out unit costs for coaching services is 1977-80. It has, however, been estimated by them that the unit costs for 1982-83 would be 61 per cent higher than those for 1979-80. With this escalation factor, the unit costs per passenger kilometre for various classes of travel for 1982-83 have been computed and shown in Table 3.10.\*

Table 3.10

Unit cost per passenger km. for 1982-83

(In Rupees)

Class	Broad Gauge	Metre Gauge
A.C. First .. ..	0.486	0.897
First .. ..	0.275	0.422
A.C. 2-Tier .. ..	0.155	—
A.C. Chair Car .. ..	0.070	—
Second Express .. ..	0.050	0.058
First Ordinary .. ..	0.881	1.093
Second Ordinary .. ..	0.071	0.074

4.13. The unit cost per passenger Km. for Second class ordinary for 1982-83 is 7.1 paise for Broad Gauge and 7.4 paise for Metre Gauge. These costs are exclusive of general overheads<sup>@</sup> and central charges<sup>†</sup> which are estimated to be about 12 per cent for Broad Gauge and 16 per cent for Metre Gauge. It would not be appropriate to make a straight comparison of these unit costs with the basic rate of 7.5 paise per passenger km. worked out by us for 1983-84. This is because:

1. The basic rate of 7.5 paise per Km. tapers off to 3.75 paise per Km. for distances over 1,200 kms., whereas the unit cost represents an average figure.
2. Though the unit cost for Second class Mail/Express is lower than that for the Second class ordinary, the basic rate for Second class Mail/Express is 40 per cent higher than the rate of 7.5 paise per km. for Second class ordinary.
3. The unit costs indicated above are for 1982-83. These will go up in 1983-84 due to escalation in prices.

4. The unit costs would substantially go up once the provision for renewal and replacement is made at the level indicated by us in Part IV of the Report.

5. The unit costs worked out by the Railways are not precise and the Zonal Railways have been asked by the Railway Board to make a recheck.

4.14. Some of the above factors are compensating in nature and we feel that the basic rate of 7.5 paise per passenger kilometre worked out by us for 1983-84 is not high. Once the Railways fare structure is built up on this rate, they would be able to sub-stancially cover the cost of passenger services.

#### 5.0. Our observations and recommendations.

5.1. The Committee are of the view that the fixation of fares is a matter which deserves serious consideration. The Government can no longer afford to be ad-hoc and somewhat arbitrary. The fare structure must be cost-based and have a scientific and rational base.

5.2. The basic scale of fares as worked out by us in Table 3.8 (Page) should be adopted for constructing the fare structure for Second class ordinary. For other classes of travel, the indices suggested by RTEC and reproduced in Table 3.6 (Page) should be applied. This would result in the following percentage increases.<sup>§</sup>

1. Upper class .. 17.4 per cent
2. Second class (Ordinary) .. 36.4 per cent
3. Second class (Mail/Exp.) .. 35.3 per cent

5.3. The effect of increase on the short-distance travel is shown in Annexure A. 3.6 (Page).

5.4. The additional earnings that would accrue to the system on the application of the fares proposed by us would roughly be :

Class	(Rupees in crores)
1. Upper class .. ..	23.4
2. Lower class	
(i) Second class ordinary	154.1
(ii) Second class Mail/Exp.	253.9
3. Total .. ..	431.4 <sup>‡</sup>

5.5. The above increases to come in one instalment might be considered too steep. In that case fares may be raised in stages but the whole process of bringing in the cost-orientation approach to the fixation of fares should be completed in a period of two to three years.

5.6. Presently, the First class fare is the same both for ordinary and Mail/Express trains. RTEC felt that a differential between the two is justified for the same reasons which necessitate a difference in the Second

\* Source : Railway Board's letter No. 81/AC/Slat./Chg., 14, dated 16-8-82.

@ General Overheads comprise expenditure on General Manager's office, Accounts Office, Medical Department etc. These are estimated to be 11.6 per cent of direct costs for Broad Gauge and 13.4 percent for Metre Gauge.

† Central Charges consist of expenses of Railway Board, RDSO and Audit. As percentage to total costs, these are about 0.62 per cent for both Broad and Metre Gauges.

§ Cf. Annexure A-3.5.

‡ Cf. Annexure A 3.7.



ordinary and Second Mail/Express fares. They recommended that while the First class Mail fares should be five times the corresponding Second class ordinary fares, the First class ordinary fares should be only four times the Second class ordinary fares. We, however, consider that the introduction of another series of tickets is bound to cause administrative and accountal difficulties. Besides the proportion of passengers travelling in First class in slow moving trains is negligible. In view of this we recommend that there need be no difference in the two fares and that the First class fare should be what RTEC has recommended for Mail and Express trains.

5.7. The Committee find that the unit costs per passenger kilometre for First class ordinary (88 paise for Broad Gauge and Rs. 1.09 for Metre Gauge) are much higher than those for First class Mail/Express (27.5 paise for Broad Gauge and 42.2 paise for Metre Gauge). In fact these are even higher than the unit cost for A.C. First class (49 paise for Broad Gauge and 90 paise for Metre Gauge). Such a situation is clearly indicative of a poor occupancy ratio of First class coaches attached to slow moving trains. The Committee would strongly recommend that this aspect should be studied in detail and wherever necessary, the composition of trains rationalised to improve the occupancy and utilisation of coaches.

5.8. We recommend that alongwith raising of fares, the Railways should pay more heed to the quality of service provided by them. They should identify areas where the problem of over crowding is endemic and has reached beyond tolerable limits. In these sections, additional passenger trains should be introduced even if it means provision of additional terminal and sectional capacities. Such steps are also necessary to meet increases of traffic in the coming years. They should also ensure that the trains run to time, that the coaches are kept neat and tidy at all times, the lavatories are clean and that the electric fittings are in order. Complaints continue to be voiced about the quality of food served by the Railways. The catering on the Railways has thus to be considerably improved. We have also noted that the booking facilities are inadequate and that there are long queues at the booking windows. The reservation charts are not pasted on the coaches well in advance of the departure of the trains and the boards on which these charts are placed are not well lit, as a result of which the passengers are put to a lot of inconvenience and harassment. Once the Railways pay attention to these important aspects and provide proper facilities and amenities to the travelling public, the increase in fares would not evoke the same protests and resentment as in the past. The Committee have dealt with some of these aspects in their earlier Reports and would deal with the rest in subsequent Reports.

#### 6.0. Conclusions

6.1. The fare structure on the Railways has been subjected to several ad hoc changes and aberrations in the past. This practice should cease forthwith. The fares should have a clear rationale and based on the structure of costs.

6.2. No action has so far been taken by the Railways to formulate the fare structure on the basis of scale of fares recommended by RTEC. The basic scale of fares suggested by RTEC has been updated by us. These updated rates should be used to determine the level of fares to be charged for various classes and distances of travel.

6.3. The occupancy ratio of First class ordinary is poor. Railways should study this aspect in detail and rationalise the composition of trains to improve the utilisation of coaches already in short supply.

6.4. Though RTEC had recommended a differential between the First class ordinary and Mail/Express fares, introduction of another series of tickets is likely to cause administrative and accountal difficulties. No differential in the two fares is recommended.

6.5. Alongwith raising the fares, the Railways should improve the quality of service.

Annexure A.3.1

(Cf. para 2.3

#### Actual and adjusted costs in 1976-77 Extracts from RTEC's Main Report, Volume I, Statement number 6.5

(Amount in crores of Rupees)

	Actual expenditure	Estimated escalation/ Appropriate provision		Adjusted Expenditure
		Percentage increase	Amount	
1	2	3	4	5
I. Price escalation				
1. Ordinary Working Expenses.	1,548.75	28.81	446.19	...
2. Add effect of Awards* and additional DA instalment.	...	...	38.00	...
3. Total	1,548.75	31.3	484.19	2,032.94
II. Appropriate provisions.				
4. Repairs and Maintenance.	...	...	10.00	10.00
5. Depreciation Provision.	135.00	...	102.47**	237.47**
6. Pension Provision.	34.40	...	13.84	48.2
7. Total (4+5+6).	169.40	...	126.31	295.71
III. Net Miscellaneous Expenditure.	21.67	...	...	21.67
IV. Total Expenditure (3+7+III).	1,739.82	35.1	610.50	2,350.32
V. Dividend	209.05	...	...	209.05
VI. Total Costs (IV+V).	1,948.87	31.3	610.50	2,559.37
VII. Net Surplus	87.24	...	157.08	244.32
VIII. Gross Traffic Receipts (VI+VII).	2,036.11	37.7	767.58	2,803.69
IX. Additional earnings in relation to total costs.	1,948.87	39.4	767.58	...

\* Running Allowances Committee, Tandon Committee on Re-classification of Artisan Staff and additional DA instalment likely to be considered after the instalment sanctioned from 1-11-1979.  
\*Additional provision.

\*\* After allowing for contributions from the production units and interest on balances.

@ Return at 10% on Capital-at-charge (Rs. 453.37 crores) less dividend (Rs. 209.05 crores).



*Annexure A.3.2  
(Cf. para 3.1)*

**Extracts from the RTEC Main Report Volume (I) giving the methodology of Tariff Escalation.**

After examining the details relating to the ordinary working expenses and contribution to the Pension Fund for the last few years, the share of the major categories of expenditure in the total working expenses may be assumed to be approximately as follows :

1. Staff	55%
2. Fuel	
(a) Coal	9%
(b) Diesel	9%
(c) Electricity	4%
(d) Total Fuel	22%
3. Other Stores and Materials	23%

On the basis of adjusted total costs for the year 1976-77, it has been observed that the working expenses excluding contribution to the Depreciation Fund and Dividend but including contribution to Pension Fund forms about 80 per cent of the total expenditure. It may be proper to allow tariff escalation only on this part of the expenditure.

The escalation required in the future years can then be worked out on the basis of the following formula :

$$\text{Total escalation (per cent)} \\ = 0.80 \{ -(0.55xs) + (0.09xc) + (0.09xd) + (0.04xe) + (0.23os) \}$$

Where s = per cent increase in staff cost.  
c = per cent increase in coal price.  
d = per cent increase in diesel price.  
e = per cent increase in electricity charges  
os = per cent escalation in the prices of stores and other materials.

The escalation in staff cost may be related to the increase in the average per capita emoluments of Railway employees or the increase in the "Index Number of Wage Rates" for selected occupations brought out by the labour Bureau, Government of India, whichever is lower. The escalation in the costs of fuels can be arrived at on the basis of increase in the actual unit prices paid by the railways for the respective items. The escalation for Stores and other material can be worked out on the basis of the index numbers of wholesale prices for the following items alongwith appropriate weights as indicated below :

<u>Items</u>	<u>Weight</u>
Iron & Steel	50
Electrical machinery	20
Non-ferrous metals	10
Lubricating oils	10
Manufactured products	10

The percentage escalation in different items may be worked out on the above basis. As the costs of these inputs constitute only about 80% of the total expenditure

of the Railways, and depreciation and dividend contribution would not escalate in this manner, the formula provides that the escalation percentage will be worked out accordingly. What is proposed is that the basic tariff rates envisaged by us should be escalated at least once a year on this basis. The two most important such basic rates are :—

- (i) For passengers, the second class ordinary passenger fare at 100 kilometres.
- (ii) For goods, the freight rate for class 100 at 100 kilometres.

The passenger fares for other classes and distances, as explained in the concerned chapter, are related to the second class ordinary passenger fare in the form of an index. The rates for different classes of goods traffic are also related in percentage terms to the rates for class 100. Therefore, once the escalation formula is applied to these two rates, the other fare and freight rate will be automatically adjusted. A similar method may be applied to other tariffs such as those for terminal charges, Parcels and various other rates for passengers and goods suggested by us.

*Annexure A.3.3.  
(Cf. para 4.4)*

**Depreciation on assets as on 31st March, 1976 on current cost replacement basis.**

(Rupees in crores)

Particulars	Value of assets as on 31-3-70†	Value of assets as on 31-3-81†	Depreciation worked out on value of assets on 31-3-81*	Depreciation on value of assets as on 31-3-76 (4)+(2)+(3)
1	2	3	4	5
1. Structural engineering	545.2	735.1	79.1	58.7
2. Track				
(i) Permanent way	1,520.5	1226.4	234.9	222.6††
(ii) Bridges	2	670.2	42.8	
3. Rolling Stock				
(i) Locos	560.0	953.7	100.2	58.8
(ii) Carriages (including EMUs).	557.7	775.2	107.8	77.5
(iii) Wagons	772.4	1,069.0	234.8	169.6
4. Equipment (M & P etc.) other than Rolling Stock.	253.2	457.6	85.8	47.5
Total	4,209.0	5,887.2	885.4	634.7
			say 635.0 adjusted to Rs. 775 crores.	

† Block Account figures for respective years. For the year 1975-76, separate figures for Permanent way and Bridges are not available.

\* Details shown in Part IV of RRC's Report.

†† Out of Rs. 222.6 crores it is presumed that Rs. 190 crores would be for Permanent way and the balance Rs. 32.6 crores for Bridges.

£ Rs. 635 crores is the amount of depreciation on gross basis. Credit due to released material @ 25% for track and 1.1% for other than track amounts to Rs. 52.5 crores. The net amount of DRF would thus be Rs. 582.5 crores. Assuming a 10% escalation per annum, the provision of Rs. 582.5 crores for 1980-81 will get enhanced to Rs. 775 crores for 1983-84.



**Annexure A.3.4.**  
(Cf. para 4.8)

**Projections of Ordinary Expenses for 1983-84**

(Rupees in crores)

Particulars	RTEC figures for 1976-77	Adjusted for 1980-81 prices*	Projection for 1983-84*
1. Ordinary working expenses break-up :			
(a) Staff	851.8	1,110.7	1,277.3
(b) Stores	356.1	506.4	723.4
(c) Fuel :			
(i) Coal	139.4	245.2	429.1
(ii) Diesel	139.4	214.0	323.1
(iii) Electric	62.0	86.6	113.4
Total	1,548.7	2,162.9	2,866.3

\* The adjustment for 1980-81 prices has been done on the basis of increases in relevant economic indices for 1980-81 over those for 1976-77. The projections for 1983-84 prices have been done on the basis of past trend for the period 1977-78 to 1980-81. The increase in 1983-84 over that in 1980-81 works out to 32.5 per cent. The actual increase in composite wage index from 1980-81 to 1981-82 being about 13.5 per cent (Cf. Annexure A-1.1, the increase of 32.5 per cent projected for 1983-84 is considered realistic. Detailed calculations of the projections are shown below :—

**STAFF COST.—**

Year	Average annual wage bill per employee
	(In Rupees)
1976-77	5,724
1977-78	6,461
1980-81	7,464

**1. Staff cost adjusted for 1980-81.**

$$\frac{851.8 \times 7,464}{5,724} = 1,110.7$$

**2. Percentage increase in wages from 1977-78 to 1980-81.**

$$\frac{7,464 - 6,461}{6,461} \times 100 = 15\%$$

Assuming that the staff cost from 1980-81 to 1983-84 would go up by the same percentage as happened in the interregnum 1977-78 to 1980-81, the projected expenditure for 1983-84 price level =  $1,110 \times 1.15\% = \text{Rs. } 1,277.3$  crores.

**Projection for stores expenses for 1980-81.**

(Rupees in crores)

Expenditure on stores for 1976-77 356.1

Break-up as per the weightage recommended by RTEC :

1. Iron & Steel (50%)	178.1
2. Electric machinery (20%)	71.2
3. Non-ferrous metals (10%)	35.6
4. Lubricating oil (10%)	35.6
5. Manufactured products (10%)	35.6

The adjustment of the above expenditure to 1980-81 prices has been done using the wholesale price indices of the corresponding items :

Category	Item for which wholesale price index number taken
1. Iron & Steel	Iron, Steel and Ferro Alloys
2. Electric machinery	Electrical machinery
3. Non-ferrous metals	Non-ferrous metals and Alloys
4. Lubricating oil	Fuel, Power, light and lubricants
5. Manufactured products	Manufactured products.

Applying the wholesale price indicators† for the years 1976-77 and 1980-81, the adjusted expenditure for 1980-81 works out as under :—

Category	Adjusted expenditure (Rupees in crores)
1. Iron & Steel	259.5
2. Electric machinery	91.5
3. Non-ferrous metals	48.5
4. Lubricating oil	54.6
5. Manufactured products	52.3
Total	506.4

**Projections of Stores Expenses for 1983-84.**

Assuming that the increase in 1983-84 over 1980-81 will be the same as the increase in 1980-81 over 1977-78, the projections of working expenses for 1983-84 would work out as under :

	(Rupees in crores)
1. Iron & Steel	384.0*
2. Electric machinery	116.2
3. Non-ferrous metals	65.5
4. Lubricant oil	82.4
5. Manufactured products	75.3
Total	723.4

**Fuel expenses for 1980-81 and 1983-84 price levels.**

The fuel expenditure on coal, diesel and electricity has been adjusted to 1980-81 price level by adopting the wholesale price indicators or the following items :

Category	Items for which wholesale price index number taken
Coal	Coal
Diesel	Fuel, power, light and lubricants
Electricity	Electricity

The adjusted prices for the year 1980-81 work out to :

Category	Adjusted prices (Rupees in crores)
Coal	245.2
Diesel	214.0
Electricity	86.6
Total	545.8

Assuming that the increase in 1983-84 over 1980-81 would be of the same order as the increase in 1980-81 over 1977-78, the projected expenses for 1983-84 would work out to :

Category	Projected expenses (Rupees in crores)
Coal	429.1
Diesel	323.1
Electricity	113.4
Total	865.6

\* Wholesale price index number for iron, steel and ferro/alloy for 1980-81 is 272.4 and for 1977-78, 188.2, the increase being 48 per cent. The projection for 1983-84 would thus be :  $259.5$  (adjusted expenditure for 1980-81)  $\times 1.48 = \text{Rs. } 384.0$  crores.

Working expenses for other items have been similarly projected.

† These have been taken from Indian Railways year Book 1980-81.



Annexure A.3.5.  
(Cf. Para 5.2)

## First class fares-Existing and proposed

Distance slab (Kms.)	Mid- Point (Kms.)	Exist- ing Fare	Pro- posed Fare	Percen- tage Increase (+) decrease (-)	Proportion of passen- ger earnings as per Passenger Zone Sta- tistics 1980-81
		Rs. P.	Rs. P.		
1-25	13	19.00†	15.00	(-)-21.0	0.3
26-49	38	21.00	16.30	(-)-22.4	0.4
50-80	65	27.00	26.50	(-)-1.9	0.9
81-250	166	53.00	64.00	(+)-20.7	9.2
251-500	376	106.00	126.00	(+)-18.9	25.4
501-800	651	166.00	196.00	(+)-18.0	17.2
801-1000	901	213.00	253.00	(+)-18.7	9.0
1001-1500	1,251	281.00	325.00	(+)-15.7	18.0
1501-3000	2,251	411.00	515.00	(+)-16.8	19.8

The percentage increase varies with the distance. To arrive at the average percentage increase, weightage has been given to the proportion of earnings in various distance slabs. Distance slabs have been so chosen as to correspond with those in the passenger zone statistics for 1980-81. The weighted average works out to 17.4 per cent.

## Second class ordinary fares-Existing and proposed

Distance slab (Kms.)	Mid- Point (Kms.)	Exist- ing Fare	Pro- posed Fare	Percen- tage Increase	Proportion of passen- ger earn- ings as per Pas- senger Zone Sta- tistics 1980-81
		Rs. P.	Rs. P.		
1-25	13	0.90	1.40	55.5	11.5
26-49	38	2.50	3.25	30.0	15.4
50-80	65	4.10	5.30	29.0	13.9
81-250	166‡	9.20	12.80	39.0	31.0
251-500	376	19.00	25.20	33.0	15.0
501-800	651	29.50	39.10	32.5	6.2
801-1,000	901	38.00	50.50	32.7	1.7
1,001-1,500	1,251	48.00	65.00	35.4	4.0
1,501-3,000	2,251	77.00	103.00	33.7	1.4

Weighted percentage increase=36.4%

## Second class fares Mail/Express/Existing and proposed

Distance slab (Kms.)	Mid- Point (Kms.)	Exist- ing Fare	Pro- posed Fare	Percen- tage Increase	Proportion of passen- ger earn- ings as per Pas- senger Zone Sta- tistics 1980-81
		Rs. P.	Rs. P.		
1-25	13	2.00	4.20	110.00	0.8
26-49	38	4.00	4.55	13.7	2.0
50-80	65	6.00	7.45	24.2	3.2
81-250	166	13.00	18.00	38.5	14.4
251-500	376	25.50	35.30	38.4	27.4
501-800	651	41.00	55.00	34.1	19.3
801-1,000	901	54.00	70.00	29.6	7.3
1,001-1,500	1,251	69.00	91.00	30.4	12.8
1,501-3,000	2,251	106.50	145.00	36.1	12.7

Weighted\* percentage increase=35.3%

† This is the minimum fare for travel in Mail/Express trains in First class otherwise the fare is Rs. 10.00 for a distance of 13 Kms.

‡ The mid point falls in the distance slab 165-170 kms. and hence the proposed fare has been worked out for 168 kms. i.e., for the 'half stage' as recommended by RTEC. Similar calcula-

Annexure A.3.6  
(Cf. Para 5.3)

## Existing and proposed fares for Second Class for short distances.

Distance slab (Kms.)	Mid- point (Kms.)	Exist- ing pas- senger fare for Second class Ordinary	Pro- posed Second class Ordinary fare	Percen- tage in- crease of (4) over (3)	Exist- ing Second class Mail Express	Pro- posed Second class Mail Express	Percen- tage increase of (7) over (6)
		Rs. P.	Rs. P.		Rs. P.	Rs. P.	
1-05	3	0.70	0.80@	14.3	1.50	4.20*	180.00
6-10	8	0.70	1.00	42.8	1.50	4.20*	180.00
11-15	13	0.90	1.40	55.5	2.00	4.20*	110.00
16-20	18	1.10	1.80	63.6	2.50	4.20*	68.00
21-25	23	1.30	2.15	65.4	3.00	4.20*	40.00
26-30	28	1.90	2.50	31.6	3.50	4.20*	20.00
31-35	33	2.20	2.90	31.8	4.00	4.20*	5.00
36-40	38	2.50	3.25	30.0	4.00	4.55	13.7
41-45	43	2.70	3.65	35.2	4.50	5.15	14.4
46-50	48	2.80	4.00	52.8	4.50	5.60	24.4
51-55	53	3.50	4.40	25.7	5.00	6.20	24.0
56-60	58	3.70	4.75	28.4	5.50	6.65	20.9
61-65	63	4.10	5.15	25.6	6.00	7.25	20.8
66-70	68	4.30	5.50	27.9	6.50	7.70	18.5
71-75	73	4.40	5.90	34.1	6.50	8.30	27.7
76-80	78	4.60	6.25	35.9	7.00	8.75	25.0
81-85	83	5.10	6.65	30.4	7.50	9.35	24.7
86-90	88	5.30	7.00	32.4	7.50	9.80	30.7
91-95	93	5.40	7.40	37.0	8.00	10.40	30.0
96-100	98	5.70	7.75	35.9	8.00	10.90	36.2

Annexure A.3.7  
(Cf. Para 5.4.)Anticipated additional revenue from passenger traffic  
(Rupees in crores)

- Budgetted earnings for 1982-83
 

Upper class	125.9
Lower class	1,068.2
Total	1,194.1
- Add 7% for growth in passenger traffic 83.6
- Anticipated earnings for 1983-84 at existing level of fares. 1,277.7

Anticipated revenue of Rs. 1,277.7 crores from passenger traffic in 1983-84 at the existing fares has been broken up into :

- Upper class-passengers,
- Lower class passenger in the same ratio as budgetted for 1982-83.

The further break up of the lower class passengers into Second (Ordinary) and Second (Mail) has been done on the basis of the ratio shown in the passenger zone statistics for the year 1980-81. The position that emerges is as under :—

	(Rupees in crores)
Upper Class	134.8
Lower Class	
(a) Second class (Ordinary) 423.4	
(b) Second class (Mail) 719.5	1,142.9
Total	1,277.7

After applying the weighted percentage increase to these earnings, additional earnings anticipated due to proposed increase in fares work out as under :—

	(Rupees in crores)
Upper Class	23.4*
Lower Class :	
(a) Second class (ordy.) 154.1	
(b) Second class (Mail) 253.9	408.0
Total	431.4

tions have been made for other mid-points

\* See foot note for First class.

(@) Minimum distance charged is for 5 Kms.

\* Minimum distance charged is for 35 Kms.

\*\* Weighted percentage increase in First class has been applied to the entire Upper Class.



## CHAPTER IV

### FREIGHT

#### 1.0 Introduction.

1.1. The goods traffic on the Railways has gone up considerably in the last three decades. The originating traffic increased from 93 million tonnes in 1950-51 to 245 million tonnes in 1981-82. The average lead of traffic also went up from 470 kms. to 709 kms.

1.2. Table 4.1\* illustrates the growth of freight traffic from 1950-51 in terms of tonnage, lead and net tonne kms.

Table 4.1  
Freight traffic

Year	Tonnes Originating (in millions)	Index	Lead (in kms.)	Index	Net Tonne Kms. (in billions)	Index
1	2	3	4	5	6	7
1950-51	93.0	100	470	100	44.117	100
1955-56	115.9	125	510	108	59.576	135
1960-61	156.2	168	561	119	87.680	198
1961-62	160.5	172	568	121	91.218	207
1962-63	178.8	192	563	120	100.693	228
1963-64	191.1	205	559	119	106.841	242
1964-65	193.8	208	549	117	106.570	241
1965-66	203.0	218	576	122	116.936	265
1966-67	201.6	217	578	123	116.607	264
1967-68	196.6	211	605	129	118.860	269
1968-69	204.0	219	613	130	125.140	284
1969-70	207.9	223	617	131	128.248	291
1970-71	196.5	211	648	138	127.358	289
1971-72	197.8	213	674	143	133.265	302
1972-73	201.3	216	678	144	136.531	309
1973-74	184.9	199	662	141	122.354	277
1974-75	196.7	211	683	145	134.304	304
1975-76	223.3	240	664	141	148.219	336
1976-77	239.1	257	656	139	156.756	355
1977-78	237.3	255	686	146	162.687	369
1978-79	223.4	240	693	147	154.824	351
1979-80	220.0	234	716	152	155.995	354
1980-81	220.0	236	720	153	158.474	359
1981-82 **	245.8	264	709	151	174.202	395

1.3. The Railways are poised for a phenomenal growth of traffic. In Part 'I' of our Report, we have estimated@ that by the turn of the century the quantum of goods traffic to be carried by the Railways would lie somewhere between 375 and 413 billion net tonne kms., approximating to originating tonnage of 585 to 664 million tonnes. It would be a very uphill task for the Railways to move this huge level of traffic. They would have to urgently modernise their equipment, devise overall operating strategies and optimise their performance. To ensure that while the Railways do not lose long-distance freight traffic to other modes, and at the same

time remain a profitable and productive network, it is necessary that they have a freight structure which has a scientific, rational and commercial base instead of being an exercise in ad-hocism.

1.4. There have been several ad-hoc changes in matters relevant to freight rates in the recent past. Some of these are :

1. The exemptions given to edible oil, salt, 'gur' 'shkhar', jaggery, foodgrains, oil-seeds and chemical manures from the levy of surcharge were withdrawn from 1st April, 1979.
2. A supplementary charge of 15 per cent was imposed from 15 July 1980 on all goods traffic excepting some essential commodities which were exempted from this increase.
3. A supplementary charge of 15 per cent was imposed from 1st April, 1981 except on commodities like salt, firewood, charcoal etc.
4. A supplementary charge of 10 per cent for distances upto 500 kms. and 15 per cent for distances beyond 500 kms. was levied on all goods traffic from 1st January, 1982.
5. From April, 1982, the exemptions granted to certain commodities from levy of supplementary charge were withdrawn.
6. The classification of coal has been revised three times during the period 31st March, 1980 to 31st October, 1982.

It has been reported to the Committee that in the recent past ad-hoc decisions have also been taken in respect of loading tolerances, clubbing of longer route on operational considerations.

1.5. It has already been brought out that while the transportation cost of Railways has increased, freight levels have not been increasing in consonance, though the gap is now getting narrowed. The losses suffered by the Railways from year to year in carrying certain commodities† consumed by the poor sections of the society are given in Table 4.2. The losses would have been higher if adequate provision had been made for renewal and replacement. To reduce these losses, the exemptions granted to some of the commodities from the levy of supplementary charge has been withdrawn from 1st April 1982.

Table 4.2

#### Losses† on low-rated Commodities

Year	Loss (Rupees in crores)
1976-77	49.3
1977-78	40.9
1978-79	62.5
1979-80	66.8
1980-81	133.5
1981-82 (estimated)	11.1

\* Source : 1. Indian Railways Year Book 1980-81.  
2. Annual Report and Accounts 1980-81.

\*\* Estimated.

@ Cf. para 10.5 of Chapter I of Part II of RRC's Report.

† These are foodgrains, fodder, salt for edible use, edible oils etc

† Source : Obtained from Railway Board.



## 2.0 Approach to the problem-RTEC.

2.1. The freight structure is now based on a basic scale of Class 100 and other Classes are percentage Classes of this basic scale. When RTEC gave their recommendations in April 1980, bulk of the traffic was classified at scales less than Class 50. RTEC accordingly proposed a basic class scale corresponding to the present Class 50 which was nearer the scale of rates for the bulk of the commodities than the existing Class 100.

2.2. The freight structure recommended by RTEC had the following features for wagon loads :—

1. Commodities would be grouped under different classes ranging from a percentage Class 65 to Class 260.
2. There would be basic Class 100 Scale\* for haulage, from which all other percentage Class rates would be worked out. The basic Class 100 scale is shown in Table 4.3.

Table 4.3

### Freight rate vis-a-vis distance

Distance slab (in kms.)	Rate per quintal per Km. (in paise)
1-100	2.35
101-200	1.41
201-300	1.175
301-500	0.9635
501-800	0.893
801-1200	0.8225
1201-1600	0.752
1601-2000	0.6815
2001-2500	0.658
2501 & over	0.6345

3. The rates would be calculated for blocks of distances the highest kilometre of each distance block being taken for the purpose. These blocks are shown in the Table 4.4.

Table 4.4

### Blocks

Distance (in kms.)	Block
1-50	One
51-250	5 kms.
251-800	10 kms.
801-2400	25 kms.
Beyond 2400	50 kms.

4. There would be a separate terminal charge† to be added to the haulage rate. The terminal charges for different gauges†† are shown in Table 4.5.

Table 4.5

### Terminal charges

Gauge	Rate per 4-wheeled wagon for both ends (in Rupees)
Broad	150
Metre	115
Narrow	65

\* This corresponds to Scale 50 of the existing classification Scale.

† Terminal expenses are not affected by the distance over which the goods are carried and they remain the same irrespective of the lead of the traffic. The terminal service includes documentation, storage facilities, shunting for attaching and detaching of wagons etc.

2.3. RTEC have mentioned that the basic scale evolved by them had the following features :—

1. The taper@ at 100 kms. and at 3,000 kms. conformed broadly to the cost taper. The taper cost without terminal was from 100 to 35 from 100 kms. to 3,000 kms. and the haulage rate proposed by them would have a taper of 100 to 36 from 100 kms. to 3,000 kms.
2. The rate levels were kept relatively higher compared to the costs in the short distance range roughly upto 400 kms. as a deliberate policy keeping in mind the recommendations of the National Transport Policy Committee in regard to Inter-modal split of traffic.
3. The percentage excess of the rate over cost declined gradually from this range, but this had been kept sufficiently high for leads from 400 to 1,900 kms., as the bulk of the traffic was carried in this range so that necessary surpluses could be generated over and above the costs.
4. The increase in the freight burden had been further lightened for traffic beyond 1,900 kms. while ensuring that the rates were more than the costs.
5. The fully distributed costs were covered for all distances from 100 to 3,000 kms.
6. The basic scale had been evolved in such a way that the traffic in the various commodities grouped under different classes would together give the additional revenues which, in RTEC's view, the Railways should generate from freight traffic.

2.4. The general principle adopted by RTEC for formulating the tariff rates was that "except for very special reasons, no stream of traffic would be carried at rates which would, for that stream as a whole, not meet the costs directly to be ascribed to that stream of traffic. The contribution to total revenues of each stream of traffic would, however, vary according to what that stream of traffic can bear".

2.5. The terminal charges, rates of the basic scale and the corresponding rates of the percentage classes and the classifications of the commodities were kept at such levels as would give an additional goods earnings of Rs. 515 crores, at the same level of traffic and operating efficiency as in the year 1976-77. If, therefore, the operating efficiency improved or the Railways carried more traffic than what was carried by them in 1976-77, the quantum of additional earnings would be higher.

2.6. As already mentioned in the previous Chapter, it was recommended by RTEC that the tariff level should be adjusted from time to time 'in such a manner that the Railway tariffs keep pace with changes in the prices of major inputs in the production of Railway services.' RTEC had also suggested a formula for escalation of tariff for the future.

†† In the case of booking from one gauge to the other, the terminal charges would be those appropriate to the gauge of the station at which the wagon is booked.

@ Cf. foot ante.



### 3.0. Appropriate level of freight rates in 1983-84.

3.1. We note that the freight structure has not so far been revised in accordance with the recommendations of RTEC. Further, though the freight rates have been increased by the levying adhoc supplementary charges or by changing the classification of commodities, no serious attempt has been made to bring in the cost orientation approach and to put the goods rates on a scientific and a rational basis. The escalation formula given by RTEC has also not been used for updating the freight rates from year to year.

3.2. The escalation formula given by the RTEC is common for both passenger and goods traffic. This formula has been updated by us and as indicated in the previous Chapter, the increase in expenditure in 1983-84 over that in 1980-81 is anticipated to be roughly of the order of 50 percent. To compensate this increase, the basic scale of Class 100 and other charges, would have to be raised by 50 percent. Once the basic scale is adjusted, the freight rates for all commodities would reach the requisite levels.

3.3. With the increase in the basic scale and other charges by 50 percent, the Railways would be able to generate in 1983-84 additional resources of the order of Rs. 378 crores.\*

### 4.0. Taper.—

4.1. Telescoping of rates with distances is an accepted principle and is in vogue on most of the Railways abroad. The theoretical reasons for the taper are :

1. The terminal costs are independent of the length of the haul; the longer the haul the greater the distance over which the constant terminal cost can be spread.
2. For longer distances even the line haul cost is relatively lower.
3. It is in line with the value of service principle as understood in economics. This principle is also called the principle of 'what the traffic will bear'.†
4. If the telescoping in railway rating is not done, the consequential rates for long hauls would have a serious affect on the volume of movement).

4.2. RTEC suggested levy of a separate terminal charge instead of an integrated freight rate and recommended a taper on the basis of cost of haulage of general traffic for different distances. They were in favour of adoption of a taper so as to ensure that the telescoping of the rate to lighten the burden on longer distance traffic is not carried farther than can be justified by cost considerations.

4.3. Table 4.6 gives the distance zone-wise distribution of traffic together with the earnings contributed by each segment of such traffic :

Table 4.6

Traffic and earnings in various distance zones		
Distance of Zone (in kms.)	Percentage of traffic	Percentage of earnings
1—40	7.8	1.1
41—120	9.7	1.9
121—240	11.0	3.5
241—350	9.8	4.7
351—499	7.8	5.3
500—799	17.4	17.0
800—1,299	17.9	25.9
1,300—1,899	12.9	26.2
1,900—2,399	3.6	8.8
2,400 and above	2.1	5.6

Though 46% of the traffic moves in the distance zone 1 km. to 499 kms., its share of earnings is only 16.5 percent. On the other hand, in the distance zone 500 kms. to 1,900 kms., 48.2 percent of the total traffic is handled and this traffic yields as much as 69.1 percent of the total earnings. What, therefore, the Railway charge in this distance zone really matters. Hence the slope of the taper in this distance zone assumes comparatively greater importance.

4.4. The Committee have studied the tapers which have been in force on the Railways since 1 October 1958 and have compared them with the taper recommended by RTEC. The comparison is shown in Table 4.7.

Table 4.7

Distance (in kms.)	Taper			
	Taper from			RTEC's @ taper
	1 Oct. 1958	1 April 1970	1 April 1974†	
1	2	3	4	5
100	100	100	100	100
200	76	74	74	73
600	54	51	60	46
1000	46	45	53	38
1400	41	41	49	35
1800	38	38	46	32
2200	35	36	43	30
2600	32	33	40	29
3500	29	31	37	28

4.5. The variation of taper with distance is illustrated in the graph at page 91.

4.6. The taper recommended by RTEC in the distance zone 500 kms.-1900 kms. is comparatively much steeper than the tapers which have been in force on the Railways from time to time since 1 October, 1958. It is not so in the case of passenger traffic where the taper suggested by RTEC is not very much different from the existing taper for Second class which accounts for bulk of the passenger earnings.

\* Cf. Annexure A-4.1.

+ A principle of economics enunciated by Taussig.

† This is the extant taper.

@ Including terminal charges at the rate of 75 paise per quintal. The terminal charges have to be added to the taper suggested by RTEC for comparison as the remaining tapers are inclusive of terminal charges.







4.7. We do not endorse the taper recommended by RTEC in view of its sharpness, and may delineate what we consider as a reasonable and scientific taper.

1. We have clearly brought out in Part II of our Report on Transportation that the Railways are overwhelmingly the most suitable and cost-efficient mode of transport for medium and long-distance haulage. In view of this, on a general principle, while the rates for short-distance movement should be high, the same should be rationally graduated for medium and long-distance rail-borne movements.
2. In view of the importance of medium and long distance haulage to the balanced economic growth of the country, such a graduated scale of taper is necessary to encourage rail-borne movement. At the same time such tapering should be consistent with the needs for resource mobilisation through the freight structure for the development of the system itself.
3. The scheme of taper should not have an inbuilt disincentive towards earnings and must compare favourably with the rating of other modes of transport.
4. RTEC suggested that the taper formulated, by them will produce an 'inbuilt surplus' in each slab of the taper. We feel that in view of the sudden and sharp drops in the taper this purpose is not achieved in actual practice for the various distance-zones. We agree with the basic objective of RTEC that the taper should produce specific surplus for each slab of the taper and, therefore, think that the taper should be more rationally graduated.

4.8. In view of the rationale indicated above :

1. We feel that the sharpness of the taper recommended by RTEC for goods traffic is not suitable even for the objective enunciated by them.
2. We recommend that the existing taper i.e. the scale in existence from 1 April 1974 onwards should be continued.
3. This taper is scientifically graduated and its a result of evolution and serves the interest of both the user and the Railway.

#### 5.0 Terminal charge.—

5.1. The issue of levying a separate terminal charge or making it a part of an integrated freight rate has been comprehensively gone into both by the Freight Structure Enquiry Committee\* and the Rail Tariff Enquiry Committee. The views of these expert bodies are briefly given below :

5.2. **Freight Structure Enquiry Committee (1955-57).—**When this Committee was appointed, the practice on the Railways was to levy a separate terminal charge. The Committee found that on most of the foreign railways, there was no separate terminal charge, but the freight rate included the cost of all services rendered by the Railway. They were of the view that the system of levy of separate terminal charge should be abolished

as both haulage and terminal services should be considered a part of the total transportation service and included in the total transport charge. They, therefore, proposed that the freight rate should be an integrated rate covering all costs. This recommendation was accepted and since then the terminal charge is included in the freight rate.

5.3. **Rail Tariff Enquiry Committee.—(1980)** RTEC were in favour of levying a separate terminal charge and the grounds on which they made this recommendation were :

1. In the costing studies made by the Railways, separate costs have been worked out for terminal and line haul. The expenditure on account of terminal services remain constant irrespective of the distance over which the consignment is hauled.
2. In an integrated rate, where the terminal element is included in the per tonne rate, the obvious anomaly is that a commodity which is loaded to the full carrying capacity of a wagon, pays much more towards terminal charges than a commodity which loads much less per wagon. This obviously is unfair and an undue burden on commodities which load well per wagon. A per wagon terminal charge in the case of load consignment will have the advantage that the incidence of terminal charge will be more equitably distributed among commodities. This would also facilitate the freight charges for commodities which give low weights per wagon being charged on a basis commensurate with costs, because the incidence per tonne in such cases of the terminal charge will be higher than in the case of commodities which give higher weights per wagon. This will be a useful instrument in addition to an appropriate increase in the classification level of such commodities to help cover costs. A per wagon terminal charge will also be an incentive for parties to make better use of wagon space and load more as the incidence of terminal charge per tonne will decline as the weight increases. This will, therefore, help in improving the load per wagon also.
3. If there are different rates of increases in terminal costs and line haul costs, these can be appropriately reflected in the rate levels from time to time.

5.4. We have deliberated over this complex issue. The terminal costs fluctuate from Railway to Railway. Moreover though the Railways work out only average terminal cost, they are likely to vary from commodity to commodity. The levy of a separate terminal charge is likely to lead to endless disputes and possible litigations. Besides, it would be administratively inconvenient both from the point of view of levy and accountal. Further, in the case of change of gauge, the levy of a separate terminal charge on the basis of number of wagons used at the booking end would make matters worse and lead to further difficulties.

5.5. Taking into account the pros and cons of the issue, we consider that the terminal charge should not be shown as a separate component but integrated in the overall freight rate as was recommended by the Mudaliar Committee and as is the practice now.

\* Headed by Shri A. Ramaswami Mudaliar



## 6.0. Supplementary charge.

6.1. RTEC had recommended that a uniform supplementary charge on the freight rate was not a scientific and a satisfactory method of generating additional revenue and should be resorted to only when there was no time to make a detailed examination and work out increases in freight rates on the basis of the capacity of the different commodities and different streams of traffic to bear the burden. The better method was to revise the level of freight rates so as to spread the burden equitably according to the ability of the different commodities and streams of traffic over various distances to bear the increases while keeping in mind the costs entailed in transportation.

6.2. We endorse these views of RTEC. In less than two years period\* the Railways levied supplementary charge on three occasions and on the fourth occasion withdrew the exemption from levy of supplementary charge on certain commodities. We recommend that this practice of levying supplementary charge on an adhoc basis, without detailed examination and not based on convincing, rational or equitable long term considerations, should cease. The Railways should urgently build their freight structure on the basic scale recommended by RTEC (with appropriate changes regarding the taper and the addition of terminal charges to the rate itself) and every year they should update the basic Class-scale using the escalation formula.

## 7.0. Slab.

7.1. The extant practice on the Railways is that the fares and freight are calculated at the maximum distance of the stage. RTEC have also recommended that the highest kilometre of each distance block should be taken for the purpose of calculating the freight rate for the distance block. But in the case of passenger fares, they have recommended that the calculations should be based on half-stages. For instance, the chargeable fare for a 10 Kms. stage should be equal to the appropriate fare for 5 Kms. In the case of a 5 Kms. stage, the chargeable fare would be equal to the appropriate fare for Kms. This deviation from the extant practice was suggested by them on grounds of simplification and equity.

7.2. The Committee are of the view that on such issues a uniform policy should be followed both for passenger and goods traffic. We, therefore, recommend that the present practice to charge at the maximum of each slab should continue both for fare and freight.

## 8.0. Frequent freight revision.

8.1. The rail users have complained about the frequent revision of freight rates. For example, The Mineral & Metals Trading Corporation of India Limited (MMTC) have mentioned† that while negotiating with foreign buyers the contracts of sale of iron ore, they have to take into account the rail freight elements as it forms a substantial component of the total F.O.B. cost. Frequent revision of the freight rates by the Railways completely upsets the economics of the deal. They mentioned that in the last two years, there have been such steep increases in the freight rates that the economics of iron ore export has been considerably eroded. They strongly felt that the freight rates should be revised not

more than once a year and that too only at the time of presentation of the Railway Budget. Similar views have been voiced by several other bulk users of rail transport.

8.2. There is considerable force and substance in what MMTC says. The freight tariff in the past used to be revised by the Railways generally once a year. It is only in the recent past that freight revisions have become more frequent. Such frequent revisions are neither good for the Railways nor for the users. They upset the economics of distribution and marketing and lead to budgetary problems for the users. As for the Railways, the notifications of frequent revisions do not get permeated to all the station staff in time as a result of which they continue to charge the public at the old rates resulting in treatment lacking in uniformity and in under-charges and justified audit criticism.

8.3. We consider that except in rare and unavoidable situations, the Railways should not increase their freight rates oftener than once in a year. Rare and unavoidable situations which may entitle the Railways to go in for a mid-year revision of freight would include the following :—

1. A steep increase in the rates of fuel, consisting of coal, diesel oil and electricity.
2. A steep increase in the prices of basic railway material like steel and cement.

Such a step would be rational and would remove the apprehension in the trade about adhocism in freight rises. Since this will be a continuing process, this should be studied as a regular measure by a special cell in the Board.

## 9.0. Quality of service.

9.1. There is criticism from the rail-users about the way the Railways handle their goods traffic. The usual complaints are about the supply of unsuitable and defective wagons, delay in settlement of claims, adhoc and frequent changes in the freight rates, inadequate free time allowed converting demurrage from a deterrent to a coercive revenue measure, inadequate terminal facilities etc. The rail customers are also critical of the Railways diverting their goods to other parties and not respecting the contract of transport to carry the commodities to the consignee. Some interceptions might be justified when breaches and similar other calamities take place but, if these are made frequently, and without strong reasons or to cover the Railways' own deficiencies in planning, no blame can be ascribed to the customer if he regards this unjustified. Such diversions have also been challenged in Courts of Law. Recently, according to a news report on 22 December, 1982 the Supreme Court have held the diversion of coal wagons as "wholly improper and illegal"

9.2. It is recommended that the Railways do adopt a business-like approach to promote customer understanding and relationship. Otherwise, regular increase in freight rates though otherwise might be justified on cost-considerations, would be criticised as arbitrary measures adopted by a monopoly supplier of transport. We would deal with some of these aspects in greater detail in a subsequent Part of our Report on Commercial Affairs.

\* From 15 July, 1980 to 1st April 1982.

† MMTC mentioned this to the Working Group on consumers constituted by us.



## 10.0. Conclusions.—

10.1. The practice of levying supplementary charge without a long term rational basis should cease and the Railways should urgently build up their freight structure on the basic class-scale recommended by RTEC.

10.2. The freight rates should as a rule be updated annually using the escalation formula suggested by RTEC and rationalised by us.

10.3. The taper recommended by RTEC for goods traffic is too sharp. The existing taper is considered reasonable and should be retained.

10.4. The terminal charge should not be shown as a separate component but integrated in the overall freight rate, as is the practice now.

10.5. A uniform principle in respect of charging for each slab should be applied for both fare and freight and the present practice of charging at the maximum of each slab may continue for both.

10.6. Except in exceptional circumstances mentioned by us, freight revisions should be carried out once a year.

10.7. The Railways should improve the quality of service.

## Anticipated additional goods earning in 1983-84

	<i>Rupees in crores)</i>
1. Earnings worked out by RTEC on the basis of freight structure recommended them for the volume of traffic which existed in 1976-77.	1,791*
2. Applying 50 per cent increase,† earnings for the volume of traffic which existed in 1976-77 would be.	2,686
3. Net tonne kilometres of goods revenue earning traffic in 1976-77 (in billions)	144
4. Anticipated net tonne kilometres of goods revenue earning traffic 1983-84 (in billions)	177‡
5. Goods earnings anticipated in 1983-84 for the anticipated level of traffic in 1983-84 with the freight structure proposed by the RTEC and duly updated to take into account price-escalation.	$2,686 \times 177$ <hr/> 144
6. Goods earnings anticipated in 1983-84 at the current level of freight charges.	3,301
7. Additional earnings which will accrue as a result of application of RTEC's formula (.5)–(.6).	2,923
	378



\* Actual earnings from revenue goods traffic in 1976-77 were Rs. 1,276 crores. With the structure proposed by RTEC, an additional earnings of Rs. 515 crores was anticipated, thus making a total of Rs. 1,791 crores (Cf. para 15.015 and 16.97 of Main Report (Volume I) of RTEC.

† Cf. Chapter III Para 4.9.

‡ Total revenue tonnage is estimated (by Railway Board) to be 245 million tonnes for 1983-84 Average lead (Revenue) is expected to be 722 kms. for 1983-84. Therefore, traffic for 1983-84 is anticipated to be 177 billion net tonne kms.



## SUMMARY OF RECOMMENDATIONS

## Chapter I

## A Profile Of The Problem

1. The Railways should aim at earning a financial return of 10 per cent on their Capital-at-charge for the immediate future. A higher rate of return would have been suggested but for the Railways now having to appropriate large sums to DRF. The Capital-at-charge is only a fraction of what the assets would cost now. The return of 10 per cent, therefore, constitutes a small percentage of the current cost of capital employed is not unattainable.

(Paras 2.7 and 2.8)

2. For formulation of a proper tariff structure it is essential to prescribe how much net surplus the Railways should earn over and above the dividend payable to the General Revenue.

(Para 2.9)

3. The present woes of Railway finances are, to a large extent, attributable to their not taking into account the impact of inflation while formulating their fare and freight structure. This situation should be retrieved on a high priority and fare and freight structure made cost-oriented. Simultaneously, the Railways would have to make serious efforts for optimising the efficiency and productivity of the system.

(Paras 3.0 and 4.0)

## Chapter II

## Suburban Fares

4. The suburban fare is presently very heavily subsidised. This is inimical to Railway finances. It is also inequitable to shift a large burden to non-suburban passengers. The Government should, therefore, take urgent steps to rationalise the suburban fare structure.

(Paras 1.4, 3.11 and 3.20)

5. The suburban traffic is poised for a phenomenal growth. By the turn of the century it would be around 160 billion passengers kms. (200 per cent higher than the present level) and unless the season ticket fares are equitably raised, eventually the losses would be colossal.

(Para 3.23)

6. Second class MST should be priced at 24 times the single journey fare, in two phases. In the first phase, within the next three years, and in realistic instalments, such MST should be priced at 20 times the single journey fare. The residual increase should be brought about in the second phase. The phasing has been recommended to ensure that the burden of the accumulated subsidy is not passed on to the present consumer in one stroke.

(Paras 3.13, 3.14 and 3.14.1)

7. In respect of First class MST, RTEC recommended that this should be priced at four times the Second class MST. In view of the heavy subsidy involved, we recommend that First class MST should be priced at six times the Second class MST. RTEC's recommendation in this regard having already been implemented, the residual increase may be made during the next three years.

(Paras 3.13 and 3.14)

8. The quarterly season ticket should be charged at three times the MST fare, with a 10 per cent rebate given as an incentive.

(Para 3.17)

9. Whenever single journey fares are increased, corresponding increases in the season ticket fares should also be made.

(Para 3.23)

10. It is not in the public interest that the Railways, which are an important segment of economy, should continue to incur heavy losses from concessional season ticket fares. Besides, the low suburban fares are frequently leading to unplanned growth of metropolitan centres with concomitant difficulties in housing and sanitation, education and life-standards, ecology and environment and even law and order.

(Para 4.3)

## Chapter III

## Non-Suburban Fares

11. The fare structure hitherto has been subjected to adhoc changes and aberrations. The fare revisions have not adequately reckoned with the inflationary pressures which eventually has made passenger transport a losing business. The situation may be immediately retrieved and the leeway made up.

(Paras 1.4 to 1.6)

12. There should be no reluctance on the part of the Government to make justifiable annual revisions in fares on the basis of the escalation formula suggested by RTEC and further rationalised by us.

(Para 4.1)

13. The fare structure should thus be formulated on the basis of the basic rate updated by us, taking into account RTEC's other relevant recommendations relating to tapcr, slab etc.

(Paras 4.9 and 5.2)

14. The increase in fares may be arranged in stages; but the process should be completed in two to three years, to finally bring the fares in line with costs.

(Para 5.5)



15. RTEC's recommendation that there should be a differential between Ordinary and Mail/Express fares for First class will bring about complications without commensurate benefits. This is, therefore, not endorsed by us.

(Para 5.6)

16. The average unit costs per passenger kilometre are indicative of a poor occupancy ratio of First class coaches in slow-moving trains. A detailed study of the same may be undertaken for further rationalisation in the use of such coaches.

(Para 5.7)

17. Simultaneously with the revision of the fare structure, the Railways should make serious endeavours to improve the quality of their service in order that travel is made more comfortable.

(Para 5.8)

#### Chapter IV

##### Freight

18. The bulk of the Railways' earnings being from freight traffic, it is essential that the pricing in respect of the same is done on scientific and rational parameters.

(Para 1.3)

19. The Railways should forthwith abjure adhoc supplementary charges to generate additional revenue, and rationalise their freight structure on an orientation towards the cost structure.

(Para 3.1)

20. The taper recommended by RTEC is unduly sharp and does not seemingly produce a surplus in each slab. The taper in existence from 1st April, 1974 is scientifically graduated and may continue.

(Para 4.0)

21. The terminal charges should be an integrated part of the overall freight rate.

(Para 5.0)

22. The Railways should build their freight structure on the basic scale recommended by RTEC and further rationalised by us regarding the taper and the terminal charge.

(Paras 6.1 and 6.2)

23. The computation of freight charges may be updated annually, using the formula suggested by RTEC and rationalised by us.

(Para 6.2)

24. Both in respect of fare and freight the charges should be worked out at the ceiling of each distance block as at present.

(Para 7.0)

25. The freight rates should not normally be revised more than once a year except in rate and unavoidable situations.

(Para 8.3)

26. The revision of fare and freight structure is a continuing exercise and should be carried out by a special cell in the Railway Board.

(Para 8.3)

27. The Railways should be business-like and should improve the quality of the freight transport service rendered by them for giving better satisfaction to the customer.

(Para 9.0)

Sd./-  
Prof. Ravi J. Matthal

Sd./-  
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Sd./-  
Russi Mody

Sd./-  
M. Satyapal

Sd./-  
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H.C. Sarin  
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Sd./-  
Dr. S.K. Ray  
(Secretary)

10 January, 1983.

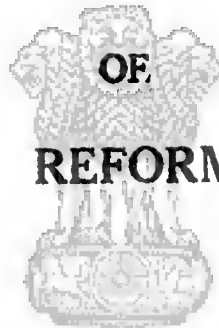




सत्यमेव जयते

भारत सरकार Government of India  
रेल मंत्रालय Ministry of Railways

**REPORT**  
**OF**  
**THE RAILWAY REFORMS COMMITTEE**



सत्यमेव जयते

**Part VII**

**SECURITY**

**MARCH, 1983**



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## INTRODUCTION

The security environment on the Railways has been steadily deteriorating. The public and the Parliament have naturally been concerned at the rapid and continuous increase in crimes against persons travelling by trains, and their property.

The Railways function in the existing social and political environment over which they have no control and whose influence they cannot escape. The overall deterioration in recent times in the law and order situation is a socio-political phenomenon and this has engulfed many parts of the country. Total improvement is possible only when there is concomitant improvement in the entire socio-political environment. The Railways cannot be considered in this context in isolation. The issues involve all sectors of our social, economic and political life and social milieu.

We have, however, in this Part limited ourselves to the crime situation prevalent on the Railways, and have attempted to devise specific solutions to bring about improvements to the extent possible. This Report seeks to develop such a remedial strategy through recommendations made in each Chapter.

Our Report also tries to rectify a distortion, which has got embedded in the minds of people, that the responsibility for law and order on the Railways is directly under the control of the Railways and, therefore, of the Central Government in the Railway Ministry. The Report seeks to dispel this mistaken impression and to explain the responsibilities of the State Governments (who control the Government Railway Police) for the law and order situation on the entire network of the Railways.

Simultaneously, the Report seeks to analyse the effectiveness of GRP and the reasons which have inhibited the growth of this force and have rendered it largely ineffective. The basic lapse has been its stunted growth and the neglect meted out to the system by almost all the State Governments.

The performance of the Railways, who share 50 per cent cost of its upkeep, has suffered due to a resultant inadequate security environment, because of a dichotomy of control on policing between GRP and RPF. We have, therefore recommended an increase in the manpower of the Government Railway Police. We have also felt that the present cofinancing arrangement by the Railways and the State Government is anachronistic and a spill over from the time of the Railway's Company management and should be given up. The States should take over this responsibility unequivocally and in entirety. There can be no split responsibility, financial or otherwise, in the maintenance of law and order.

An important change recommended by us is the merger of the existing GRP with the District Police. Failure to do so earlier has been a major cause in the Force being rendered ineffective. This has also been the proximate cause for the lack of coordination between the concerned authorities. We appreciate that in making this radical departure, we are seeking a change in the organisation of the Railway Police as it has existed for 80 years. We

have, therefore, given to this aspect of the matter our careful consideration and have concluded that there is no other way.

The crimes on running trains particularly against persons, which have been exercising the minds of the people and the Government, have to be tackled, in our opinion by establishment of mobile posts manned by the District, Police, which would permit them to register the crime in most cases and more promptly, so that the culprits are increasingly brought to book.

We have noted the lack of attention of some State Legislatures over the crime situation on the Railways. We have traced this apathy to the District level, where the District Superintendent of Police also generally does not show much concern. The Parliament, however continues to be greatly exercised as is clear from its debates and discussions.

In the Centre, there is the practice of the Parliament Questions pertaining to crime being answered by the Ministry of Railways. We have considered that this is not correct or rational and have recommended transfer of this responsibility to the Ministry of Home Affairs, which is the nodal coordinating Ministry in respect of crime control and maintenance of law and order. When this recommendation has been accepted and implemented by the Government, we expect that the State Government would also evince greater concern and involvement.

The role of RPF, which has been created for the protection of Railway's own property and the property entrusted to it for carriage, and which lies at railway installations has not been performed to any satisfactory standard. This has been re-defined and the idea of equipping it with increasing powers to take over the functions, which fall under the normal domain of GRP, has not been supported by us. In a sense, this Force is being limited to the purpose for which it was created. In doing so, a slight change has been suggested by giving it additional limited powers of preliminary investigation when it is near the place of occurrence so that it facilitates the conviction of the guilty. In a way, this is a logical extension of what has already been achieved by the Railway Property (Unlawful Possession) Act, 1966. We have also sought to correct the arrangement under which RPF is frequently asked to shoulder responsibilities for which they have neither the statutory nor the administrative wherewithal, and which rightfully belongs to GRP.

RPF, over the years has grown not as a part of the Railway administration, but as a more or less independent entity. It has, therefore, been recommended that this becomes a part of the mainstream of the Railways. In doing so, its interface with the Commercial Branch has been recognised. At the same time, modernisation of the Force has been recommended.

It is considered that with the changes contemplated in the functioning of GRP and RPF, their effectiveness would increase, and this would bring a welcome relief to rail user by promoting the security of his travel and the safety of his goods and luggage entrusted to the Railways for transport.



## CHAPTER I

### AN OVERVIEW

#### 1.0. Introduction.

1.1. The interface of the Railways with the public is intimate, both for travel and movement of freight. A secure environment is necessary for the Railways to perform efficiently. The security on the Railways is looked after by the Government Railway Police (GRP) and the Railway Protection Force (RPF), the former for the travelling public, their property and the railway personnel, while the latter for the property entrusted to the Railways for carriage or belonging to the Railways.

1.2. For a study of the security measures on the Railways it is necessary to know the background and growth of GRP and RPF.

1.3. The East Indian Railway in 1854 employed certain staff designated as 'Police'. These policemen looked after law and order in Railway premises and lands and protected property in goods sheds, yards, loco sheds etc. Even though called 'Police' this force did not have any statutory authority. It was also not a government force. It formed a part of privately owned Railways.

1.4. The Government of Bengal promulgated the Police Act in 1861. In 1866, the Government of Bengal undertook to provide a police-cover to the Railways at the latter's cost and to reimburse the Railway Company to the extent the creation of such a force would help to reduce the District Police. The railway company exercised full control on the government police force contingent. Subsequently, differences arose between the then provincial Government and the Company, and this caused the then Railway Police being split up in 1870 into two distinct portions, viz. the 'Government Police' entrusted with the task of law enforcement, and the 'Private Police' responsible for the protection of railway property. The genesis of the present system thus can be traced way back to 1870.

1.5. The Government appointed a Committee in 1872, called the Railway Police Committee, which defined the duties of the two-faceted Police force. These were defined as 'Class A' and 'Class B' duties respectively. The former referred to the work connected with the control of crime and the latter to the protection of goods sheds, yards, wagons and other railway property. This Committee recommended a division of the force into two parts-one performing Class A duties under the control of the government, and the other performing Class B duties at the company's own expense. The latter force was also to operate under Government control, but had to be paid for by the Railways. These duties referred to the maintenance of order at railway stations and in railway trains. In addition, there was another staff engaged on purely watch and ward duties, which was placed under railway control to be paid for by them. Thus, the 1872 Committee conceived of three units-one purely for the control of crime, the other for maintenance of law and order in railway premises and the third for purely watch and ward functions of the Railways.

1.6. The Government appointed another Committee in 1881, which recommended the complete taking over of watch and ward duties by the Railways and the replacement of the Railway Police engaged on these duties by Railways' watchmen. In 1882, consequently, the Government of India issued an order to the Railway Companies for appointing their own watch and ward staff for the protection of their property.

1.7. In 1902-03, the Indian Police Commission was appointed. The Commission observed\* that the primary duty of the Railway Police was 'preservation of law and order' but in a few cases, they also undertook watch and ward functions. The Commission did not favour the watch and ward function being given to the Railway Police as they concluded that there was no ground for making any distinction between a Railway Company and any other private owner.

1.8. In 1907, a Railway Police Committee was appointed to examine the distribution of cost of Railway Police, and to suggest modification of the principles governing it. This Committee classified the duties of the Government Railway Police into 'crime duties' and 'order duties', instead of 'Class A' and 'Class B' duties respectively. The former referred to the maintenance of law and order and the security of the travelling public, and the latter to control of passenger traffic inside the station premises, platforms, booking offices, in the circulating areas, maintenance of order in standing passenger trains and looking after of empty coaches, etc. A complete list is attached as Annexure A.1.1 While crime duties were to be provided for entirely by the Government, the order duties were to be paid for entirely by the Railways.

1.9. The Police Commission of 1902-03 and the Railway Police Finance Committee of 1907 endorsed the separation of watch and ward from law and order functions on the Railways, but suggested changes in the types of duties assigned and the share of the cost of the Police engaged in law and order duties between the Railways and the State.

1.10. This position continued till 1918. Around 1918, traffic on the Railways started increasing. The incidence of thefts of goods also started going up. The Government of India appointed another Committee in 1921 to enquire into the causes of this increase and to suggest remedies. The Committee commented adversely on the organisation of the Watch and Ward staff, finding ample evidence of connivance of railway staff in many cases of pilferage. They suggested that an exclusive Department be set up and the status of the Watchman be improved.

1.11. The formalisation, however, had to wait until the Police Commission of 1921 recommended this; but thereafter the growth of this force has been steady. Most of the Class I Railways organised their own Watch and Ward though in different ways and to different degrees.

\* Para 108, of the Report of the Indian Police Commission 1903.



The system continued despite a big spurt in thefts and pilferages during the Second World War. In 1951-52, when the Railways were reorganised into zones, Watch and Ward staff were regrouped with Superintendents of Watch and Ward, controlling a force ranging from four to nine thousand.

1.12. In 1955, B.N. Lahiri, a former Inspector General of Police, was appointed as Security Adviser to the Indian Railways. It was at his instance that Watch and Ward was changed to 'Railway Security Force'. He was also responsible for the drafting of the Railway Protection Force Act. This Act, passed in 1957, was the genesis of today's RPF.

1.13. The development of the Protection Force on the Railways has broadly been on the following pattern :

1. The Protection Force started as an amalgam of law and order and protection of property duties.
2. Its functions were separated in 1872.
3. The Watch and Ward functions were assumed by the Railways' own watchmen in 1882.
4. The Watch and Ward organisation was created as a separate entity in 1921.
5. The Railway Security Force was created in 1955.
6. The Railway Protection Force came about in 1957.

1.14. The strength of RPF has steadily increased over the years; the expenditure has also similarly increased to 16 times of what it was 30 years ago. This is clear from Table 1.1 (Page 6). This has also been shown graphically on Pages 7 and 8.

Table 1.1

## Growth of RPF

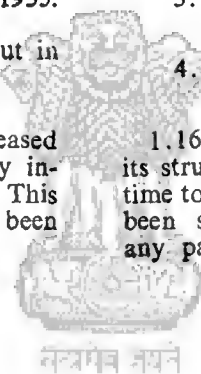
Year	Strength of Force (In persons)	Expenditure (In crores)
1951-52	30,782	3.29
1955-56 (End of 1st Plan)	39,664	4.14
1960-61 (End of 2nd Plan)	49,468	5.78
1965-66 (End of 3rd Plan)	60,000*	7.98*
1968-69 (End of Inter Plan)	60,679	10.85
1973-74 (End of 4th Plan)	63,186	15.80
1977-78 (End of 5th Plan)	65,231	26.96
1978-79	65,973	29.43
1979-80	66,471	35.08
1980-81 (Beginning of 6th Plan)	66,830	42.84
1981-82	66,565	48.44

\* Includes RPSF, which was created in 1963.

1.15. The genesis of GRP can be traced as follows :

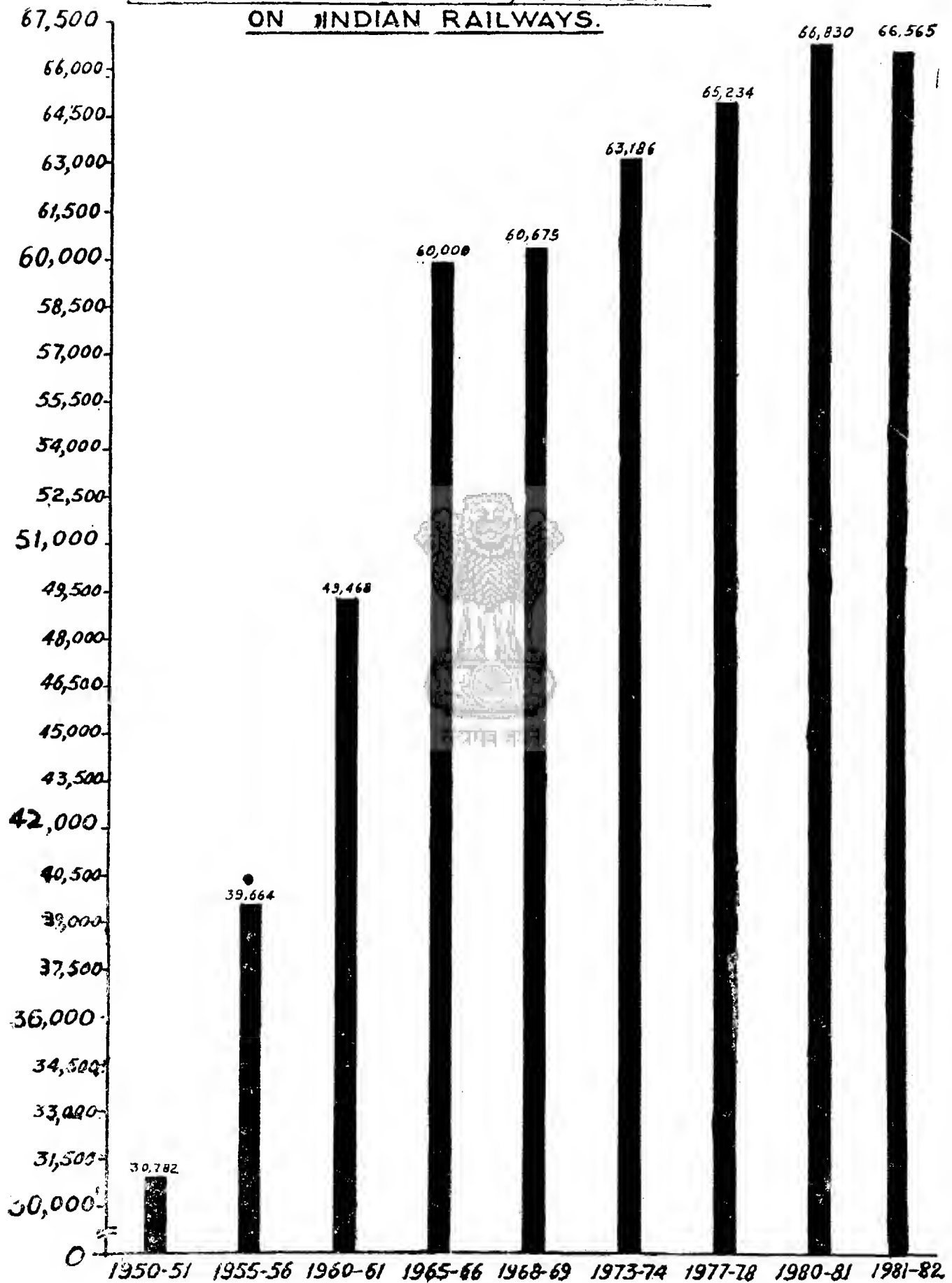
1. In 1866 the existing Police Force was accorded statutory powers on the East Indian Railway.
2. In 1872, the Railway Police was divided into Public and Private Railway Police. The former's functions pertained to maintenance of law and order and control of crime.
3. In 1881, the Watch and Ward duties were separated.
4. In 1907, the duties of the Government Railway Police were re-defined as crime and order duties.

1.16. While the growth of RPF has progressed and its structure and composition have been reviewed from time to time, the Government Railway Police has neither been subjected to such reviews nor there has been any particular increase in its strength.



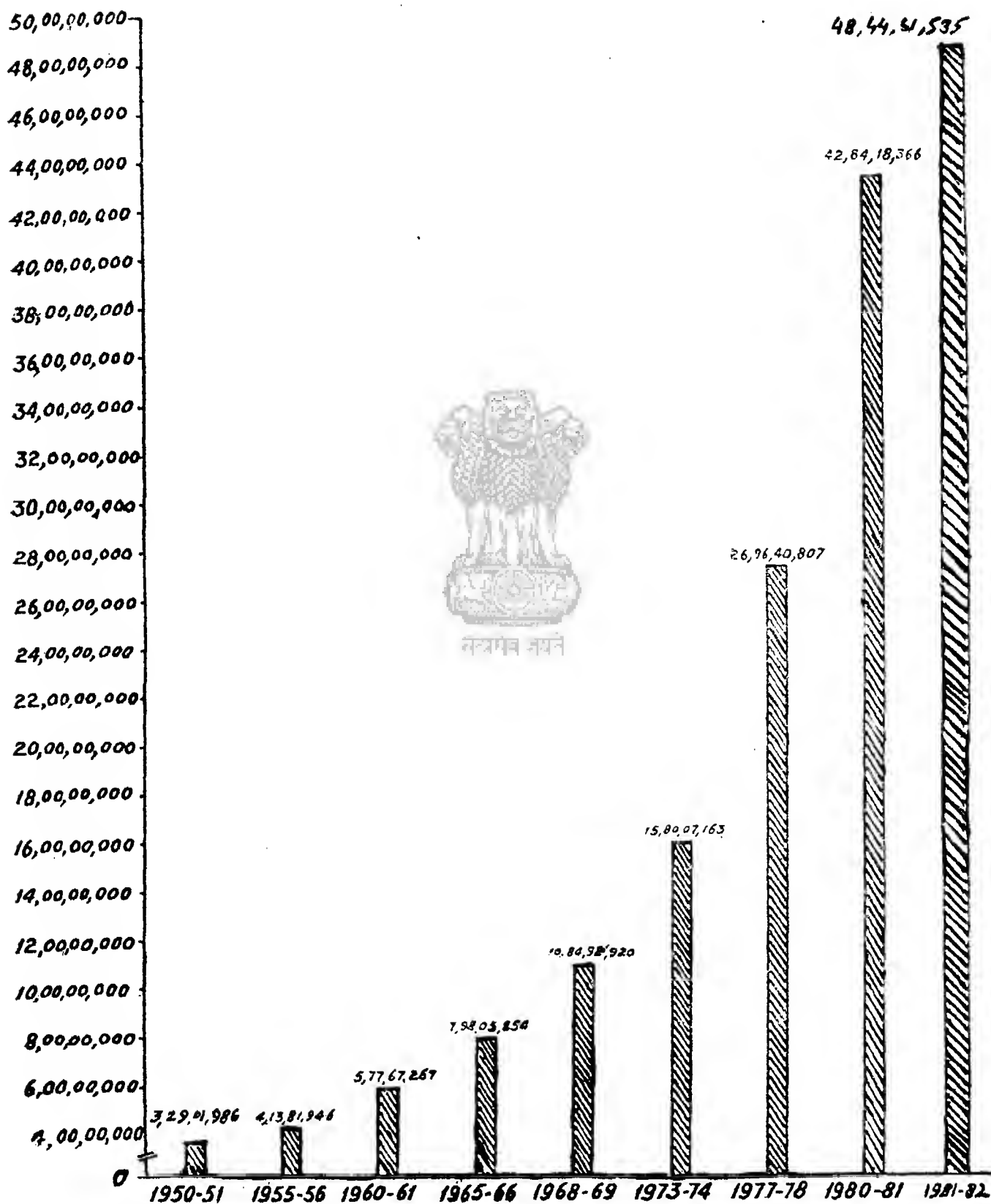


TOTAL STRENGTH OF R.P.F. & R.P.S.F. STAFF  
ON INDIAN RAILWAYS.





TOTAL COST OF R.P.F. & R.P.S.F. STAFF  
ON INDIAN RAILWAYS.





1.17. It is appropriate at this stage to study the development of these two wings of police forces separately. We shall, however, later deal with the history of the GRP, which has not been fully dealt with.

## 2.0. The Police Commission of 1902-03.

2.1. The Police Commission of 1902-03\* referred to three different systems of Railway Police administration then in operation :

1. The 'District System', under which the railway police formed part of the force of each district through which the Railway ran. This was in operation only in a part of the then Central Provinces.
2. The 'Provincial System', under which there was a separate railway police for the province, the jurisdiction being bounded by the limits of the province, irrespective of the Railway limits.
3. The 'Railway Administration System' under which there could be a separate railway police for each Railway, irrespective of the provincial boundaries.

The Commission considered that as the unit of Police administration was the 'province', any departure was only liable to weaken the co-operation between the District Police and the force for the Railways. The Railway Police could also avail itself of the services of the provincial Criminal Investigation Department in the provincial system. The Railway Administration System involved a Police force under one local Government working within the jurisdiction of another, an arrangement which has been condemned by nearly all witnesses.\*\*

The Commission recommended the general adoption of the Provincial system, with the stipulation that there should be a separate 'Railway Police District' for each Railway administration.

2.2. This Commission realised the vital importance of continued and full co-operation between the Railway and the District Police forces. To institutionalise such co-operation a set of rules were framed :

1. The District Police stations shall, as far as possible, depute one or more constables in plain clothes to railway stations within the area of their jurisdiction to watch for the arrival or departure by the railway of known criminals or suspicious characters. The information was to be passed on to the Railway Police.
2. The Railway Police will depute a literate police officer of or above the rank of constable to accompany each passenger train. He would maintain a "train diary" to record information relevant to cognizable offences, movements of bad characters and suspects.
3. Each Railway Police station and each District Police station in the jurisdiction of the Railway would maintain a Minute Book in which requests and suggestions received by the District and Railway Police respectively would be entered, together with action taken, and the Minute Books would be examined frequently by the superior officers of both Railway and District Police.

4. Superintendents of Railway Police would meet, co-operate and liaise with the concerned District Superintendents of Police.

5. Superintendents of Railway Police should also keep in touch with District Magistrates.

6. All serious crimes including offences of which special reports had, under the Provincial Police Orders, to be submitted by District Police stations, should be specially reported at once by the Railway Police to the District Superintendent and the District Magistrate telegraphically.

7. District Magistrates should from time to time examine and comment upon the registers of Railway Police stations within their jurisdiction and Superintendents of Railway Police should reckon with such remarks.

8. Confidential reports on Inspectors and Sub-Inspectors of the Railway Police should be forwarded to District Magistrates for their opinion.

9. The Railway Police should be responsible for the prosecution of Railway Police cases, but may ask for the services or assistance of the District Prosecuting Inspector.

2.3. Many of these suggestions towards institutionalisation remain valid even now.

## 3.0. The Thompson Committee, 1921.

3.1. Under the Chairmanship of J.P. Thompson, Chief Secretary to the Government of the Punjab, the Committee was called upon to "examine the existing organisation and working of the Railway Police administration in India, which appears to be defective in certain respects, and to make proposals for the improvement (where necessary)."

3.2. Thompson Committee reiterated the retention of the provincial system of policing and made the following recommendations :

1. Creation of a Central Bureau of Information and Advice to be headed by an Inspector General of Police and to function under the Home Department : the Bureau to collect and distribute information of interest to the Railway Police about Railway crime and advise the Government of India, local Governments, Railway Board, Railway administration and Inspectors General of Police on matters connected with Railway police administration.
2. Creation of a special Detective and Investigating Agency in each province.
3. Improvement in the quantum of gazetted supervision in Railway Police.
4. Specialised training for all ranks of Railway Police in Railway working rules, procedures and Act.
5. Improvement of relations between the Railway Police and the Railway officials, the responsibility for which would be with the Provincial Police.

There has been no Police Commission after 1902 and the Commission, which was appointed in 1977, could not complete its

work in regard to security and policing on the Railways.

\*\* Para 106 of the Report of Police Commission, 1903.



3.3. The Committee, in examining the various aspects of functioning, also went into the issue of the cooperation between the Railway Police and the District Police in the light of the recommendations of the Police Commission of 1902. It observed :

"From what we have seen in different provinces we are led to the conclusion that cooperation is not a matter of rules but of men. Where cooperation is deficient, the local officers are to blame and it should be the first duty of every railway police superintendent to insist on the cultivation of friendly relations between his men and the district police and to set an example in this direction himself. Without this, rules are mere print and paper, and we can only repeat that this question of cooperation calls for the constant attention of the higher police authorities. It is specially necessary in dealing with epidemics of theft from running goods trains."

#### 4.0. The Mullick Study.

4.1. As a sequel to the upsurge in crimes and pilferages on the Railways during and after the Second World War, the Ministry of Railways assigned to B.N. Mullick, Director, Intelligence Bureau, an enquiry into the high incidence of crimes. His Report was submitted in 1954. He categorised internal and external causes for the increase. He recommended conversion of the Railway Watch and Ward into a statutory body with improved basic security measures. As regards external factors, he linked the upsurge in crime due to a lack of coordination between District and Railway Police.

4.2. He emphasised the need for closer integration and recognised that criminals operating on the Railways could be subjected to a proper surveillance only by the District Police. The active involvement of the District Police. The active involvement of the District Police was, therefore, central to any endeavour seeking to seriously curb crime on the Railways.

4.3. He opted for the retention of the Railway Police as a separate unit of the State Police but was of the opinion that the Superintendent, Railway Police, should retain only administrative control over the staff of his railway police district in matters such as postings, transfers, discipline and that the day to day control should vest with the Superintendent of the District so that crime within railway premises could be treated on par with crime elsewhere in the District.

4.4. Over the years, the functioning of the Railway Police continued to be hampered by a lack of cooperation, with the District Police, despite the exhortations by the 1902 Commission and the 1921 Committee. This was a result of many factors. To counter them, Mullick suggested that it was necessary for the District Police Superintendents to be vested with day to day control over the functioning of the Railway Police.

4.5. Mullick suggested a fusion of the provincial, the district and the railway administration systems. He also recommended a special investigating establishment under the Superintendent Railway Police (consisting of Police Officers of the calibre of those who joined the State CID and of competent Railway Claims Inspectors come to be set up.

4.6. Mullick's suggestions and recommendations were discussed after a lapse of 8 years in 1962 in a Con-

ference of the Inspectors General of Police, and the Government issued a circular indicating the action required to be taken. This letter is given in Annexure A. 1.2 (Page 35 & 36).

4.7. It is seen from the letter that Mullick was thinking of involving both the Railways and the States in security on the Railways. The Railways were supposed to participate in recommendations 3 and 7 listed in Annexure A. 1.2, while the rest pertained to the State Governments. Apparently for want of adequate interest in the States or the Railways, Mullick's report became a non-starter.

#### 5.0. Ram Subhag Singh Committee.

5.1. A high-powered Committee was appointed in 1966 under the chairmanship of Dr. Ram Subhag Singh, Minister of State for Railways\* to go into all aspects of policing on the Railways. The Committee submitted Report in 1968. Out of 177 recommendations, 168 were accepted of which five remain to be implemented. The remaining nine recommendations were rejected.

5.2. It is necessary to go into the details of the accepted recommendations, which have not been implemented. These relate to :

1. Conferment of additional powers on the members of the Railway Protection Force, over what is laid down in Sections 151 and 152 of the Criminal Procedure Code to enhance their utility.
2. Abridgement of the gap that exists between the responsibility of the Railway Protection Force, as laid down in Section 11 of the Railway Protection Force Act and their legal powers.
3. Development of a suitable statutorily protected identification mark, indicating the Railway's ownership, to be impressed on all Railway property other than the property entrusted to Railways as carriers.
4. Indictment of persons in possession of all property stamped in accordance with the above by presumption as stolen unless otherwise proved by the person owning such property.
5. Deletion of the sentence "punishable with imprisonment for a term exceeding six months" from Section 12A of the RPF Act.

5.3. The fourteen recommendations which either have not been accepted, or have remained unimplemented pertain mainly to conferment of additional powers on RPF. The Railway Ministry, it appears, have finally opted for status quo, partially in view of the expenses involved, and partially not wanting RPF to overlap the jurisdiction of GRP.

5.4. Incidentally the Committee discussed the desirability of creation of a Central Police Force for policing the Railways under the control of the Union Government, but did not make any specific recommendation in this regard.

#### 6.0. Saldanha Committee.

6.1. The high-powered Dr. Ram Subhag Singh Committee's Report was submitted in 1968. After three years, in 1971, C.G. Saldanha, an Officer on Special Duty in the Railway Ministry, submitted a Report on the

\* When he became the Minister of Communications and Parliamentary Affairs, Shri Shanti Lal Shah succeeded him.



reorganisation of the RPF. This was his term of reference and he did not therefore, examine the role and performance of GRP. He suggested raising of RPSF\* Battalions on the Zonal Railways for areas prone to criminal incidence; cking out an investigation branch to undertake investigation and conduct of enquiries; creation of a protection branch from out of the existing strength for **protection of places** not covered by RPSF; abolition of **fixed-point duty system** by beat-cum-patrol systems; **arming** of a higher percentage of the Force and decentralisation of the Crime Investigation Branch. He also suggested 'summary proceedings' for RPF personnel and inducting Commercial staff into RPF at appropriate levels, and pruning excess and deadwood from RPF for alternative jobs in other Departments.

#### 7.0. Kripal Singh Committee.

7.1. The latest enquiry report came from the one-man Kripal Singh Committee in 1976† on Security and Protection on the Railways. While this Report mainly dwelt on RPF, it did study the interface with GRP to a limited extent. This aspect would be discussed separately.

7.2. Kripal Singh studied the desirability of creating a Unified Police Force and held discussions with the State Governments on the subject. He found that the State Governments were opposed to the setting up of such an agency as 'it would amount to carving out a separate State within a State for policing purposes—a situation which would, certainly, not be desirable'.

7.3. Out of 185 recommendations, 14 despite acceptance have not been implemented.

7.4. The recommendations which have not as yet been implemented relate mainly to the recruitment, deputation, cadre strength, status, pay-scale and perquisites of RPF officers.

#### 7.5. Recommendations pertaining to GRP.

7.5.1. The Kripal Singh Committee specifically recommended :

1. Setting up of mobile outposts of Government Railway Police in selected important night trains to restore confidence among the travelling public.
2. Introduction of a system of booking and storage of passengers' unbooked luggage in a strong room at one of the ends of the coach in charge of the coach attendant, after issue of luggage tickets similar to those issued by the Indian Airlines.
3. Setting up of a mobile wireless station working on the police net in important trains to provide linkage with the Civil Police.
4. Improving the quality of the vestibuling doors.

These recommendations are still to be implemented.

7.5.2. The Committee, inter-italic also made the following important recommendations :

1. Abolition of distinction between 'Crime' and 'Order' wings.

2. Entrusting the responsibility for answering Parliament questions relating to crime on the Railways to the Ministry of Home Affairs and not the Railway Board).
3. Retention of the Government Railway Police as a separate identity and not to merge it with the District Police.
4. District Superintendent of Police being held responsible for crime control in railway premises.
5. Adoption of the yardstick for determining Government Railway Police stations and their strength, as recommended by the Conference of Inspectors General of Police.
6. Stationing of a gazetted railway Police Officer at the headquarters of each Railway division for liaison.
7. Reviewing of the headquarters of the Railway Police Districts.
8. Location of a Reporting Room in the main station building on the platform.
9. Creation of special cells in the State CIDs for crime control on Railways.
10. Separate budget provision for quarters for the Railway Police.

#### 8.0. Functional appraisal.

8.1. Evidently, the role of RPF and its pattern of functioning in today's situation has to be considered as a means to an end, which must be the objective of national transportation.

8.2. RPF has developed an embarrassing image for itself. Nothing will illustrate it better than the Report of R.B. Lal\*\* (One man Expert Committee).

Para 1101 of the Report says :

"The various memoranda sent by the public have voiced great concern at the working of the Railway Protection Force. Some have gone so far as to describe R.P.F. Rakshaks as 'Bhakhshaks' and the R.P.F. as 'Railway Pilferage Force'. Many Railway Officials too, from Head of Departments and Divisional Superintendents down to Commercial Clerks have complained bitterly of indifferent working and aggressiveness on the part of R.P.F. One Head of Department wrote to this Committee as follows :—

"With their increased powers, R.P.F. appears to be an empire within the Railway as even General Manager has no power to punish a Sainik. Even Vigilance Inspectors are afraid to enquire into the complaints against R.P.F. staff or conduct preventive checks against them for fear of arrest'.

This emphasises the need for the security arrangements on the Railways to fit in with the overall objectives of providing a smooth, economic and efficient national

\* Railway Protection Special Force.

† Kripal Singh was a former Chairman of the Railway Board.

\*\* R.B. Lal was a former Additional Member of the Railway Board. The Committee was set up in August 1969 and submitted its Report in April, 1970.



transportation system. In this context it has to be ensured that the objective is not reduced to a subservient role.

8.3 R.B. Lal Committee highlighted that the R.P.F. should have to take due share of blame in respect of theft pilferages, particularly thefts from panel cuts, which was one of the biggest single cause of claims.

8.4. Para 1104 of this Committee's Report is further reproduced :

"Based on my discussions with officials of various departments including the Director Security, I have come to the conclusion that the present difficulties stem primarily from the fact that in recent years the R.P.F. has sought to grow up as an altogether independent organisation. While the average level of Assistant Security Officers and Security Officers drawn from the railways has been more or less the same as in other departments of the railways, some of the officers drawn from the Police have in the past been liabilities rather than assets to the railways. Unknown to any one on the railways at the time of their deputation, they started with the initial handicap of being unfamiliar with the details of railway work and did not identify themselves with the great organisation which they were called upon to serve. With enhanced powers given to R.P.F. and with some unfitting types of officers having found their way into this department, it has shown some evil tendencies: for example, reluctance to cooperate with other departments, departmentalism and even aggressiveness. The weaknesses of the R.P.F. arise chiefly from these causes. Even though I have drawn pointed attention to them it is not with the intention of implying that they are universal or wide-spread, but merely to emphasise the necessity for early remedial measures so that they may be checked before they have spread too far."

8.5. It was concluded by the R.B. Lal Committee that the R.P.F. had "to identify itself whole-heartedly and completely with all the other departments of the Railways, specially with the Commercial Department." The rationale for the Commercial Department exercising some control was summed up in paras 1108, 1109 and 1110 reproduced below :—

"1108. So far as keeping watch on goods and parcels is concerned, the R.P.F. staff deployed on such duties must be trained to regard themselves for all practical purposes as members of the Commercial Department and not its masters. Only then can they do their best for the railways. If a chowkidar is employed to keep a watch on the property in a house, he would be expected to show some loyalty and allegiance to the master of the house and its other inmates. On the other hand, if he regards himself as an utter stranger or as an agent of an outside authority with no responsibility to the owner of the house, friction and even conflict are bound to arise. After all the R.P.F. is there to serve the other departments of the Railway and through them the general public.

1109. This matter is too important for the railway to be left to the sweet will or good sense of

individual officers of the R.P.F. Efficiency, co-operation and esprit de corps have to be built into the organisational pattern itself so that no one will be left in any doubt as to what is expected of him, particularly in regard to his responsibilities to other departments.

1110. For this purpose, the recent trend to develop the R.P.F. as an entirely independent organisation should be reversed and steps be taken to secure its emotional and organisational integration with the other departments of the railway. To achieve this objective and to promote the over-all efficiency of R.P.F., the following measures are recommended."

8.6. This Committee recommended complete control of the then Divisional Superintendents over the security organisation in the Division as it was basically incorrect to develop a system under which coordination in case of a dispute between a Sub Inspector, R.P.F., and a Station Master 'can be effected only at the level of General Manager'. In this connection, the note by D.U. Rao, Addl. Member (Finance), Railway Board (Later Member, Finance) appended to the Report of the High Powered Committee on Security and Policing on Railways 1966-68 was also quoted by the R.B. Lal Committee for putting the things in proper perspective, which is reproduced below\* :—

"In my view, security arrangements on the Railways should be looked at in their proper perspective as only one facet of and an ancillary to, the main function of Railways, as a transportation agency, and should, therefore, fit into the general framework of organization, supervision and control on the Railways, and be subject to the same co-ordination and control as other railway activities in all levels, viz., the Divisional, Zonal and Railway Board levels. Each Department on the Railways has its special function but the departmental pattern of organization has been deliberately given up in favour of the divisional and zonal pattern of organization under the Railway Board in the interest of efficiency and co-ordination. The Railway Protection Force should not in my view be treated differently in this respect."

8.7. We completely endorse the principle enunciated above and have discussed this in detail in Chapter V, paragraphs 3.1 to 3.3.

8.8. The Lal Committee, vide paragraph 1121 of their Report specifically considered the question of placing the Security Department under the Chief Commercial Superintendent. This paragraph is reproduced below :—

"One retired Chairman, Railway Board, expressed the view that as the Security Department exists on railways primarily for the security of packages, the C.S.O. should be under the C.C.S. There is much force in this suggestion, especially because General Managers, under whom C.S.Os. are nominally placed at present, have really no time to exercise any supervision or check on the working of the R.P.F. Under the present system, Chief Security Officer is largely left to himself with no direct responsi-

\*Cf. Paragraph 6, page 156 of High Powered Enquiry Report.



bility for anything and this, in fact, is one of the main reasons why railways could not get the best out of the R.P.F. As a first step I recommend that (a) the Security Department be placed under the General Manager for all purposes like Operating, Mechanical or Engineering department and (b) General Manager should see to it that the Chief Security Officers give the fullest cooperation to other departments, specially the commercial department".

8.9. After the abolition of the chowkidari system, where each departmental head controlled the Chowkidar, and their amalgamation into a 'Watch and Ward' Department, the overall control and supervision of this Department was placed under the CCS in most of the Railways. This system continued upto 1954 when the posts of Chief Security Officer were created.

8.10. The rationale for such a step was based on the fact that the maximum interface of the Watch and Ward staff was with the Commercial Department and better coordination with the latter could result in closer contact over all activities of such staff. The creation of an independent Security Department introduced an additional tier of coordination in the functioning of the Railways, which does not appear to have made the force fully effective.

8.11. The efficiency of the Railway organisation appears to get vitiated by the cross-pulls of departmental bias and it is in this background that we have defined the objectives of the organisation in Part II of our Report, which should serve as a guideline. In accordance with these guidelines, there seems to be a need to make coordination more effective.

8.12. We have carefully considered the various observations and recommendations of the R.B. Lal Committee, as relevant in the present context. After much consideration, we would recommend the following :—

1. At the Divisional level, the R.P.F. Department has since been placed under the DRM. The General Manager, however, still does not have full operational control over the Department in as much as the appeal under the Disciplinary & Appeal Rules against the orders passed by the Chief Security Officer lies only with the Inspector General, R.P.F., Railway Board, and not with the General Manager. We recommend that such appeals should lie with the General Managers and at the zonal level, the R.P.F. should, like any other Department be under the complete operational control of the General Manager.
2. We do not recommend that the operational functioning of the R.P.F. should vest in any other department, as, despite differences with the civil police, R.P.F. is also a force in uniform.
3. Since, however, the overwhelming bulk of the work of the R.P.F. involves a close interface with the Commercial Department, the Railways will have to ensure much greater coordination between Commercial and R.P.F. departments in the Divisions and in the Zonal Headquarters, than is evident now.
4. In order to ensure this, the Senior Divisional Commercial Superintendent and the Security

Officer on the Divisions and the Chief Commercial Superintendent and the Chief Security Officer in the Headquarters should have much closer relationship, interaction and camaraderie in the discharge of their responsibilities under the common administrative control of Divisional Railway Manager in the Division and General Manager in the Headquarters.

5. The kind of coordination relationship we are recommending is what now exists between the Chief Commercial Superintendent and the Chief Claims Officer in the Headquarters and the Senior Divisional Commercial Superintendent and the DTS on the Division.

6. It is essential that R.P.F. personnel are given instructions in the broad commercial functions and responsibilities during their tenure in R.P.F. Training Schools. For this purpose, competent Commercial Instructors should be posted to these Institutes. This will make the Sainik aware of his commercial responsibilities and will make coordination a much easier matter than it is at present.

#### 9.0. Deterioration in security.

9.1. There has been wide-spread concern on account of rapid deterioration in security of the travelling public and their property. Over the years, the deterioration has been continuously on the increase. Anguish has been voiced in the Parliament repeatedly. The Committee, in its visits and in its meeting with public bodies and railway officials, were repeatedly advised of the sense of insecurity of the travelling public both for their person and property. We agree that the situation is very unsatisfactory.

9.2. The figures of dacoities and robberies in passenger trains for the last few years are indicated in Table 1.2.

Table 1.2  
Dacoities & Robberies in Passenger Trains on Indian Railways.

	1978	1979	1980	1981	1982*	Percentage increase in 1982 over 1978 based on monthly average †
Dacoity	67	68	99	131	98	↑75.6%
Robbery	196	185	252	239	237	↑45.1%

9.3. It would be seen from the above table that in four years, the dacoities have gone up by 75 per cent. Even robberies have gone up by 45 per cent. This clearly indicates the rapid deterioration.

9.4. The number of murders in running trains are indicated in Table 1.3.

Table 1.3  
Murders in Running Trains (All Railway)

Year	No. of murders
1978	32
1979	28
1980	37
1981	35
1982*	24

Upto October 1982 only.  
Monthly average for 1982  
Monthly average for 1978  
Percentage increase.

$$\frac{9.8}{5.6} \times 100 = 75.6$$

Similarly, percentage has been worked out for the incidence of robbers.



9.5 While in the case of murders, the increased incidence in about 10 per cent or so in 1981, over 1978, in the case of Running Train Thefts, the figures are galloping and, therefore, should be a source of concern.

Table 1.4

**Running Train Thefts\* All Railways)**

Year	No. of cases
1978	1708
1979	3765
1980	5842
1981	9943
1982†	9590

Table 1.5

**Thefts of Passengers. Belongings (All Railways)**

Year	No. of cases
1979-80	6310
1980-81	5679
1981-82‡	3525

9.6. The purpose of quoting these figures is to reiterate the continuing sense of insecurity, which is affecting the minds of the travelling public. The situation in the current year also in respect of heinous crimes, i.e. dacoities, murders and theft of the property of passengers is showing a rising trend.

9.7. Alarm chain pulling and hose-pipe disconnections have assumed serious proportions in certain parts of the country. These areas are Bihar, Bengal and U.P. as would be discussed in later Chapters dealing specifically with Ticketless Travel and Alarm Chain Pulling, where even train running is becoming a casualty.

**10.0. Repercussions on performance.**

10.1. The Railways are a basic infrastructure. They traverse the entire length and breadth of the country. Considering the heavy investment, which has gone into the railway system and the necessity for channelising funds on priority to sustain the system, as discussed in Parts II to V of our Reports, it is necessary that the Railways function at an optimum efficiency level. In case this cannot be ensured, the industrial, agricultural and the economic progress of the country are bound to get affected. Efficiency can only be imparted to the system if it is allowed to work in a proper environment. This environment consists of both internal and external factors.

10.2. We have dealt with the internal factors in other reports and here we are concerned with the security aspect, which arises from the external environment in which the Railways have to function. As far as the passengers are concerned: the public is interested in the trains being run punctually and the Railways giving them comfortable and safe travel. This can be ensured provided the criminals do not indulge in vandalism and take away the carriage fittings and do not interfere with the running by rampant misuse of alarm chain pullings etc.. The punctuality, as has already been commented on in Part II, is deplorable and one of the main reasons is the unauthorised interference with the running of these services. Even Mail/Express services are subjected to interference. Evidently, if punctuality has to be

improved and if comfortable and safe travel has to be ensured, the criminal incidents have to be curbed and eliminated.

10.3. For freight trains, it is necessary that they provide speedy transport. This can be ensured only if the Mail/Express trains run to time because any interference with their running sets up a chain reaction. The slowing down of freight is a much more serious phenomenon than is generally realised. For every increase in the turn round by a day, the cost to the system is in the region of a few hundred crores. This would be evident from the fact that increase in the turn-round by a day would necessitate an additional requirement of about 40,000 4-wheeler units to handle 220 million tonnes of traffic. The cost of these wagons would be over Rs. 600 crores. This cost does not include the development of the maintenance facilities and the extra cost of staff.

10.4. It can be appreciated as to how matters are aggravated when freight trains are victimised and organised thefts are committed, which add to the slowing down of the movement.

10.5. The profile of traffic growth for future imposes a heavy burden on the Railways. By 2000 A.D. passenger traffic is expected to increase two fold and the freight traffic three fold. To meet these challenges, the Railways cannot survive if the external constraints, which hamper and impede their movement and which impinge on security directly, are not eliminated.

10.6. The story will be incomplete if the effect of lax and deficient security on the morale of the staff and rail users is not mentioned. Freight trains are run by guards and drivers and if they are victimised, they lose the confidence in the capability of the administration to provide protection and are not willing to go without proper escorts or work to their highest efficiency. Similarly, the staff, whose duty is to check the tickets of the passengers and to see that bonafide passengers are given their due, cannot do so, if organised criminal elements are able to attack them with impunity and thus shatter their morale. Assaults on ticket checking employees have become common and there have been cases (however few) in which they have been thrown out from running trains. Murders of guards by such persons in running trains have also occurred. An efficient organisation sustains itself on the efficiency of its staff and the efficiency is a function of their morale. Morale cannot be restored if the bonafide staff cannot discharge the duties entrusted to them without fear of any threat to them or their families.

**11.0. Conclusions.**

11.1. The genesis of the Security forces on the Railways i.e. the RPF and the GRP is from a common base. The bifurcation into two specific roles has arisen on account of the Railways in the past being owned by Companies and law and order being a subject for the government. This might not have happened if the Railways were State Undertakings right from the beginning. The system in today's context is anachronistic.

11.2. RPF has grown into a sizeable force and its character and organisation has been changed several times, with the objective of making it more effective. It cannot, however, be said that despite all the changes, the Force has been able to discharge its responsibilities either effectively or efficiently.

\* R.T.T. are thefts committed on goods trains during run.

† Upto October, 1982 only.

‡ Upto September 1982, i.e. ½ year.



11.3. The growth of GRP, unlike RPF, has been stunted and there is no evidence of any major reorganisation having taken place to improve its functioning. Major problems arise because of the GRP and the RPF being responsible for the security on the Railways in their respective fields and the necessity for achieving an intimate coordination between the two. This coordination has, however, never been more than paper-thin.

11.4. The RPF is entrusted with responsibility of protecting the property of the Railways, for which it is to have a very close nexus with the responsibilities of the Commercial Department. Both these should function under the administrative control of the Divisional Railway Manager in the Division and the General Manager in the Headquarters like any other discipline, and, therefore, it should be possible to enforce much greater coordination between these two departments vitally concerned with each other.

11.5. In order to promote such coordination, which is essential for security on the Railways and for improving the image of the system we have made certain specific recommendations in subsequent chapters.

*Annexure A. I. I.*

*(Cf. Para 1.8)*

#### CLASSIFICATION OF DUTIES OF GOVERNMENT RAILWAY POLICE INTO 'CRIME' AND 'ORDER' WINGS.

##### I. Class 'A'—Crime :—

(Rank and file to be paid for entirely by Government)

- (1) Detection and investigation of offences cognizable by the Railway Police.
- (2) Inquiry and report under section 132 of the Railway Act, IX of 1890.
- (3) The arrest and detention of offenders in cognizable cases and other cases in which arrest is authorised by law.
- (4) The prosecution in court of cognizable offences and non-cognizable offences under the Railway Act.
- (5) The reporting of all instances of oppression and fraud on the part of railway subordinates or others.
- (6) The travelling in passenger trains of specially selected officers and men for the prevention and detection of crime and for the surveillance of suspicious persons.
- (7) The entry in prescribed registers and books of offences, reports and complaints of all descriptions brought to the notice of the Police.

##### Class 'B'—Order :—

(Rank and file to be paid for entirely by Railways)

- (1) Control of passenger traffic inside the station premises more particularly on the platforms, in the booking offices, waiting halls and at the entrance and exit gates wherever specially required on emergencies by the station officials.

- (2) The control of vehicular and other traffic in the station compound.
- (3) The maintenance of order in standing passenger trains, prevention of over-crowding etc.
- (4) Watching loaded passenger trains when standing in stations.
- (5) The arrest of those found committing nuisance or suffering from infectious diseases and keeping the station premises clear of idlers and beggars.
- (6) Examination of all empty carriages on arrival at terminal stations for property left behind by passengers and seeing that carriage fittings have not been tampered with.
- (7) The removal of bodies of persons dying in the train and on station premises and the conveyance to hospital of sick passengers.

*Annexure A.1.2.*

*(Cf. Para 4.6)*

Copy of the letter No. 40/3 (S)/62-P.I. dated 23-3-62 from Shri N.N. Tandon, Under Secretary Ministry of Home Affairs to all State Governments (except J & K).

Subject.—Action taken on the recommendations of the Report of an enquiry held by the Director, Intelligence Bureau in 1954, on "Compensation Claims on Indian Railways".

Sir,

I am directed to say that the Conference of Inspectors General of Police held in January, 1962, reviewed the action taken on the recommendations of the Report of an enquiry held by the Director, Intelligence Bureau in 1954 on "Compensation Claim on the Indian Railways" and felt that the conclusions in Chapter XXX therein were yet to be implemented fully in the State. The recommendations *inter alia* were the following :

1. Integration of the District, Provincial as well as the Railway Administrative Systems of Railway Police should be effected.
2. The District Police must be brought fully into the picture in all the three aspects of crime control i.e. prevention, detection and prosecution.
3. A special investigation agency, jointly staffed by police and railway officers should be set up in each railway police district.
4. District Police must take adequate measures with their own resources to tackle running train and yard thefts.
5. The State Govt. should take a serious view of any increase in crime on the Railways and should invariably take the District Superintendent of Police to task for this.
6. The State Government should make the necessary changes in the Police manual so that the District Police may become aware of their responsibility fully.



7. The strength of Railway Police should be increased in some States, though in most states it is adequate.
8. The quality of police officers working on the Railways should be improved by better selection and initial training.

The Report had made it clear that these suggestions were based on agreements which were reached during the discussions with the various Railway and Police Officers and these recommendations were also in conformity with the spirit of the Indian Police Commission, 1902 and the Railway Police Commission of 1921 and only such amendment has been proposed as were found necessary as a result of experience gained during the last 30 years.

The conference was of the opinion that something had to be done to effect improvement in the situation of crimes on the railways, because there was constant pressure from the Public, Press and the Parliament that policing on the Railways should improve. I am, therefore, to impress on the State Government the urgency of giving effect to the recommendations contained in the Report

and to ensure that the working of Police on the Railways showed an immediate and appreciable improvement.

Yours faithfully,

Sd/-  
(N.N. Tandon)

*Under Secretary to the Govt. of India.*

Copy forwarded for information to :

1. The Intelligence Bureau, with reference to their U.O.No. 13/POLICE (L) /63 (11), dated 8-3-62.
2. The Ministry of Railways (Railway Board). In this connection this Ministry's endorsement No. 40/4(S)/61-P.I. dated 4-1-62 also refers.

Sd/-  
(N.N. Tandon)

*Under Secretary to the Govt. of India.*





## CHAPTER II

### TICKETLESS TRAVEL

#### 1.0. Introduction .

1.1. The Indian Railways run over 6,200 passenger trains throughout the country every day. In 1980-81, 3,612 million passengers travelled on the network, giving a daily average of about 10 million passengers. While the Railways have not been able to eliminate overcrowding in many routes, rampant ticketless travel in large parts of the country is resulting not only in wide spread loss of revenue but also in extreme difficulties to genuine passengers. A ticketless traveller also frequently resorts to indiscriminate alarm chain pulling aggravating the discomfort of the travelling public and unpunctual running of trains.

1.2. According to an assessment of the extent of ticketless travel made in 1970, such travel, excluding suburban sections, was 4.4 percent and resulted in a loss of Rs. 17.89 crores annually. In an altogether different environment of law and order, today, this assessment is no more valid. Both because of the large increase in ticketless travel and the higher fares the losses now will be many times more.

1.3. Ticketless travel is also being aggravated due to the connivance of railway staff. This is particularly true in the case of passengers coming from intermediate stations.

1.4. Ticketless travel essentially is a corollary of the deteriorating law and order situation, and a psychology amongst a section of the populace under which free trips, alarm chain pulling and vandalism of the Railways are considered fair sport. In certain vulnerable regions, particularly in the North and the East the decline in the law and order position is quite serious. The ticket-examiners do not have the confidence to enter any compartment and do their proper job of ticket checking. They feel that they are exposed to the danger of man-handling and even run a risk to life and limb. There have been cases in which they have been stabbed and the Committee have been advised that there is a general sense of insecurity amongst the ticket checking staff, because of their lack of confidence in the capability of the administration to defend them from lawless elements.

1.5. An indication of the disquieting situation can be had from the cases of assault on ticket checking staff in UP and Bihar portions of the North Eastern Rail-

way. This has been chronicled in Annexure A.2.1 It would be seen that the rot has two specific aspects in Bihar and UP : firstly, the TTEs are assaulted when they try to do their legitimate duties by checking unauthorised entry into reserved compartments or by checking people travelling with improper tickets: secondly, when organised raids are conducted, a large crowd gathers and attempts to free the apprehended culprits, and consequently leads to hasty withdrawals or lathi-charge and even firing.

1.6. Evidently, it is not possible to have a precise idea of the extent of ticketless travel prevalent on the Railways. Whatever idea can be had is from the statistics of the ticketless travellers caught by special checks. These checks do not cover all the trains regularly and, therefore, the menace is to be considered conceptually as a much deeper malaise than can be reflected by any figures. Table 2.1 indicates figures of the number of persons detected travelling without ticket or with improper ticket during the years 1974-75 to 1981-82.

1.7. There is a correlation between ticketless travel and the general law and order situation.

1.8. The special checks, as indicated later, cannot be universally conducted and for all times, such checks have to be continuous, wide-spread and without notice, covering selected trains for limited periods. They have also to be repetitive in order to have a lasting impact as experience indicates that as a result of such checks, people start buying tickets and then after some time revert to their old practice of not buying them.

#### 2.0. Effect on running of trains and revenues.

2.1. Concerted drives against ticketless travel increase the window sales, though it is difficult to give a correct idea about the increase. It is, however, evident that ticketless travel alone, if properly curbed, can generate sizeable revenues. The passenger earnings in 1969-70 were Rs. 278.9 crores. The passenger earnings anticipated in 1983-84 are Rs. 1,400 crores. If the loss in revenue of Rs. 18 crores on ticketless travel in 1970 is increased in the same proportion, it would work out to roughly Rs. 90 crores. This would be the level of loss on the assumption that the pattern of ticketless travel today is the same as in 1970.

Table 2.1  
Ticket checking drives during the years 1974-75 to 1981-82.

(Figures in lakhs)

	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82
1. No. of persons detected travelling without ticket or with improper ticket.	16.87	23.45	24.42	22.87	21.03	21.43	24.60	30.23
2. Amount of railway dues realised (in Rs.)	236.00	321.61	318.04	300.22	305.35	331.90	407.64	531.69
3. No. of unbooked luggage cases detected.	10.32	14.63	17.27	17.02	16.86	16.34	17.51	18.04
4. Amount realised from unbooked luggage cases (in Rs.)	80.29	122.77	131.64	124.28	122.67	135.54	165.28	203.42
5. Total No. of cases detected (Total of items 1 and 3).	27.19	38.08	41.69	39.89	37.89	37.77	42.11	48.27
6. Total amount realised as railway dues (Total of 2&4) (in Rs.)	316.29	444.38	449.68	424.50	428.02	467.44	572.92	735.11
7. No. of persons prosecuted	1.81	2.76	3.43	3.48	2.66	2.65	2.82	3.04
8. No. of persons jailed	1.18	1.84	2.19	2.53	1.71	1.67	1.72	1.72
9. Amount of judicial fine realised (in Rs.)	14.31	31.54	23.59	16.45	16.67	23.17	28.83	36.88



2.2. As already mentioned, train running is affected by ticketless travel in two ways : firstly, trains suffer detention because of special checks, secondly, the ticketless traveller to avoid detection also resorts to the pulling of alarm chain apparatus to get down at locations convenient to him or which would facilitate his easy escape.

2.3. It may be clarified that the detention of trains has to be viewed also in the context of increasing costs occasioned by the loss of train engine hours, coaching stock utilisation, wagon hours of freight trains held up as a repercussion and, therefore, must be eliminated to be maximum extent possible.

### 3.0. Ticketless travel vis-a-vis window sales.

3.1. There is a clear need to rationalise the system and facilities for sale of tickets, at the metropolitan and city stations as also roadside stations, with heavy passengers booking. Ticketless travellers originate more from small road-side stations, with inadequate facilities for sale of tickets and free and unchecked entry and exit of passengers. At some stations, issue of tickets is done by the staff also handling train movement etc., and therefore the booking window opens only in the nick of time for an incoming train.

Passengers often do not bother to buy a ticket in such circumstances.

3.2. The objective of the Railways should be to reduce the waiting time in the queue for any type of ticket whether it is for reservation or without reservation. It should also be so arranged that the booking window is opened sufficiently in advance for issue of tickets. It cannot be said that the existing arrangements permit the passengers to have the tickets even for unreserved journeys in metropolitan towns with any speed. Apparently, there is need to improve the infrastructure engaged in this activity. For metropolitan towns, the solution would be to go in for computerised aids and to provide an adequate number of terminals so that easy accessibility is given to the public. Self-printing ticket machines should be universally used at least in the principal metropolitan station complexes. Passenger fares should be rationalised for short distances.

### 4.0. Vulnerable Railways.

4.1. The problem of ticketless travel is fundamentally a function of the law and order situation and is, therefore, found in a less acute form in the southern States than in other parts of the country. The practice is, however, rampant in the North and the East in Railways running over the whole of Bihar, Eastern UP, Upper Madhya Pradesh and Western West Bengal. An idea can be had about this incidence from Table 2.2

Table 2.2

#### Persons detected travelling without ticket

Name of the Railway	Number of persons detected travelling with improper or without tickets			
	1978-79	1979-80	1980-81	1981-82
1. Central	311,496	304,09	339,872	415,148
2. Eastern	416,572	442,319	506,038	606,714
3. Northern	233,831	241,401	340,319	438,276
4. North Eastern	103,703	109,471	109,760	144,713
5. Northeast Frontier.	72,172	62,821	64,336	82,538
6. Southern	143,167	135,454	164,415	222,084
7. South Central	132,106	155,992	159,195	168,550
8. South Eastern	272,423	280,323	297,616	393,050
9. Western	417,513	410,789	477,976	543,818
10. CTC (Central Ticket Checking	...	...	...	7,896
<b>Total :</b>	<b>2,102,983</b>	<b>2,142,579</b>	<b>2,459,527</b>	<b>3,022,787</b>

4.2. The above statistics are given Railway-wise, but generally, northern India as covered by North Eastern, Eastern, Northern, Central and Western Railways is principally besieged with the problem. While State-wise figures are not available there are definite indications that ticketless travelling in eastern UP and Bihar is the most rampant, followed by the rest of UP, MP, Punjab, Haryana and Rajasthan. This is borne out by press reports and the experience of the Railway officers, whom the Committee have met.

4.3. The position is certainly better in the south where the incidence is not pronounced. However, ticketless travelling appears to have made a beginning even in the south and the figures in the table indicate arising trend in these areas also.

4.4. The Committee recommend that Southern, South Central and South Eastern Railways must organise themselves in a manner that all trains can be checked with regular periodicity so that the incidence is reduced while it is within control. It should be possible to ensure this by providing that all trains in these areas have been checked at least twice in a month. As far as the northern region is concerned, where the problem is deep-rooted and is linked with the general atmosphere of lawlessness, the solutions have to be both more extensive and comprehensive.

### 5.0. Vulnerable sections.

5.1. The Railway Board have been compiling statistics identifying the sections where the incidence of ticketless travelling is very heavy. These sections are indicated in Annexure A. 2.2. It would be seen that Bihar and U.P. take the pride of place. In U.P., the main lines passing through Lucknow and Moradabad Divisions of the Northern Railway appear to be the worst sufferers. The incidence is also pronounced on the branch-lines of Allahabad and Moradabad Divisions. All the feeder routes to Delhi, including the metre gauge, are also listed amongst the affected sections. On the N.E. Railway, all the branch lines and almost all the main lines, in fact, the entire network, suffer from this malady.

5.2. On the Central Railway, almost the entire portion, covering U.P. and Rajasthan, is affected. On the Eastern Railway, all the branch lines taking off from the main line in Bihar and the suburban sections in West Bengal are affected.

5.3. The Committee have gained the impression that the bad sections are becoming worse, and new sections are getting added.

### 6.0. Strategies so far adopted.

6.1. The Railways have a ticket checking organisation. Each Railway Zone has staff in the Divisions and at Headquarters. The existing organisation on Indian Railways consists of :

1. Stationary Ticket Collectors manning the entrance and exit gates at railway stations.
2. Travelling ticket Examiners to check the tickets on the trains while on the run and also to man sleeper coaches.
3. Conductors, who are incharge of reserved accommodation on trains.



4. Divisional squads of TTEs for surprise checks.
5. Headquarters squad of TTEs for surprise checks.

6.2. The strength of ticket checking staff on the Indian Railways as on 1-4-79 was as follows :—

1. *Staff engaged exclusively on ticket checking activities :*

(1) Chief Ticket Inspectors	245
(2) Head Ticket Collectors	796
(3) Ticket Collectors	7,533
(4) TTIs/TTE 'A'	1,194
(5) Travelling Ticket Examiners	5,567
(6) Scale Porters to weigh luggage of passengers in running trains.	494

2. *Staff engaged in ticket checking and amenities.*

(1) Conductors	744
(2) Sleeper Coach TTEs	6,240
(3) Coach Attendants	2,012

6.3. A Ticket Checking Cell was created in the Railway Board's Office in 1967 under an experienced field officer with four Chief Ticket Inspectors and other supporting staff. This Cell, after formation, was entrusted with the task of assessment of ticketless travel. The Cell was initially placed under a nucleus Group of executives under a Joint and a Deputy Director attached to the Chairman of the Railway Board. After completion of the initial assessment, the Cell was retained in the Board for streamlining the ticket checking activities under the Commercial Directorate. The post of Assistant Director (Ticket Checking) was discontinued after 1970 and the Cell was placed under the charge of Deputy Director, Traffic Commercial (General). Looking from hind sight this was an unfortunate decision as the drives lost their thrust.

6.4. The Cell in a way is still functioning with three Chief Ticket Inspectors, one Section Officer and other supporting staff and is dealing with policy matters relating to ticket checking, magisterial scheme, analysis of statistical data and submission of reports. This has assumed the role of an office from the erstwhile character of a 'squad' or a 'company'.

6.5. Considering the extent of the menace and the difficulties in tackling it, the Committee feel that the existing organisation in the Board should be considerably strengthened and placed under a Director, who will deal with all problems connected with interference to trains. Presently, it is functioning under the Director, Tourism, but considering the importance of checking ticketless travel and improving the services, it appears necessary that it is made the exclusive responsibility of a Directorate. \*This Directorate should also be assigned the task of dealing with policy matters and spearheading

and monitoring field drives and campaigns pertaining to ticketless travel, alarm chain pulling, disconnecting of hose-pipes, vandalism, fraudulent practices regarding printing and sale of tickets etc. The Directorate, which should be created for a period of two years in the first instance should also be equipped, as originally intended for conducting surprise checks on a massive scale on the Zonal Railways. The creation of such an organisation would impart a new impetus to the systematic checking of ticketless travel and should pay rich dividends†. Shri V.P. Sawhney did not agree with the creation of a Directorate for Ticket Checking and other activities in the Board. His views are reproduced at.

6.6. A mention is necessary about the special Railway Magistrates, who are a part of the ticketless checking endeavour. There are 110 Special Railway Magistrates (Judicial) on the Indian Railways. They are invariably associated with spot surprise checks and have the authority to try ticketless travellers and other offenders. They belong to the State Government concerned. Their office staff and peons are provided by the State Governments.

6.7. The apportionment of the cost of Magistrates and the staff between the Railways and the State Governments differs from State to State. The existing practice in various States is indicated in Annexure A.2.3. It varies from the entire cost being borne by the Railways to the entire cost being borne by the State Government. As regards the fines, these are generally credited to the State even where the entire cost of Magistrates and their staff is borne by the Railways. However, in a few States, these are given to the Railways. In States, where 50 per cent sharing of the cost is done between the Railways and the States, the judicial fines are remitted to the State Governments.

6.8. It is unsatisfactory that there is no uniform policy in regard to the apportionment of the cost of Railway Magistrates, their staff and sharing of judicial fines. The Committee consider that the sharing of the cost on 50/50 basis of Magistrates and the staff attached to them between the Railways and the State Governments should be adopted. In order to sustain the interest of the State Government the judicial fines realised should be credited in their entirety.

6.9. The Committee consider that there should be an annual system of costing of the Special Magistrates, their staff and the Police personnel, the share of the Railways and the recoveries by way of railway dues and fines so that a clear picture emerges as to whether the staff engaged for which the Railways are paying a share is fully provided for by the fines. With the creation of a Directorate for handling of train interferences in the Board under a Director, as already recommended in paragraph 6.5, the tabulation of this information may also be organised by the Cell.

6.10. The Railways have a fairly large repertoire of various types of checks, which can be listed as follows :—

1. Concentrated spot checks
2. Replacement checks

\*To the extent practicable, the officers in this Directorate should be adjusted against post from IRTS cadre given up during the last few years over the Indian Railways.

†The Committee would recommend that Shri G. P. Misra who was the Assistant Director, Ticket Checking in the Railway

Board and is known for his drive and effectiveness in this sphere, should be drafted on two year appointment as a Deputy Director and attached to this Directorate. This Committee took this evidence and found him in good health and full of energy and ideas.



3. Mobile checks
4. Magisterial checks
5. Cross country checks
6. Inter divisional checks
7. Inter Railway checks
8. Operation checks
9. 'Fortress' checks

6.11. While the distinctions between the above checks are immaterial the most important factor is to be able to prevent the emergence of any collusion between the ticket checking staff and the ticketless passenger. To eliminate this, it is necessary that the ticket checking staff are frequently changed from their place of work so that they are not able to grow any roots and the possibility of corruption is reduced. It is also necessary that periodically, ticket checking at important stations is organised by staff drawn from other Divisions/Railways. The Railways should concentrate on such checks to a larger extent than has been done. It may, however involve the absence of ticket checking staff from their families for prolonged durations. It would therefore, be necessary to frame rules so that the absence is limited to a few days at a time.

#### 7.0. Operation Barauni.

7.1. It is necessary to recall the effort against the ticketless menace made in 1970 by the Railway Board's Cell, when it was attached to the Chairman of the Railway Board. A specific code name was assigned to each operation and the code name for the first such operation, which caught the imagination of the staff and officers was 'Operation Barauni'. Concentrated checks with a large body of ticketchecking RPF and GRP personnel were arranged over a circular area around Barauni and in the feeder routes leading to Barauni in Bihar State. The ticket checking staff and their escorts were taken by road transport to a number of mid-section points, where trains were detained for checks. After one check had been done the same staff was transported again by road to another nearby section for a check on the trains in that area. The Magistrates also accompanied the party and the persons caught travelling without ticket were sent under escort to Barauni for being presented before a number of Judicial Magistrates, each trying a good number of offenders. Such checks were continued in a concentrated manner in the area and were repeated on a random basis so that all the routes were fully covered in a surprise manner. This operation was highly successful and succeeded in instilling fear amongst ticketless travellers albeit temporarily.

7.2. 'Operation Barauni' was followed by many other such operations in various vulnerable pockets of the Indian Railways. The widest number of these 'Operations' were conducted in Bihar, U.P., M.P. and West Bengal.

7.3. While the exact details of the staff are not available at this late stage some idea can be had of the staff deployed in 'Operation Barauni' from the following details furnished to the Committee by the concerned Officer, who has since retired :

No. of TTEs employed	150
No. of RPF personnel employed (including RPSF with arms).	100

- |  |          |
|--|----------|
| 3. No. of GRP personnel employed with three Railway Magistrates alongwith some local Police. | 100      |
| 4. No. of Magistrate (3 Railway Magistrates and two local Magistrates).                      | 5        |
| 5. No. of buses  | 12 to 15 |
| 6. No. of checks organised during the day.   | *        |

\* There were three batches on checking duty consisting of one Magistrate, one Railway Officer, 30 TTEs with RPF and Police Force for each batch. They were given a set programme to raid trains in mid-section or on road side stations. Each raiding party had to conduct atleast three raids on different trains and sections as found suitable and to bring the defaulters to Barauni station, where they were handed over with charge-sheets to be tried by the different Magistrates earmarked for the purpose. The raiding party Magistrates were also holding courts if they had sufficient gap between the second and the third raids. These parties were usually headed by Commercial Officers and sometimes by Officers of other branches in the divisions. CCS's Eastern Railway, NE Railway, DIG RPSF, Deputy Director, Railway Board accompanied a number of raids.

7.4. As already stated, the situation in Bihar is extremely unsatisfactory where rampant ticketless travel is having very deleterious effect on the movement of trains. On the basis of the experience gained of checks like 'Operation Barauni' it is necessary that the Railways revive them on a large scale, and these are bound to give good results. It is a pity that such formation raids even when they had produced such good results were not continued as a standing mechanism. This, in the opinion of the Committee must now be done.

7.5. However, in the background of the present conditions such checks require larger number of escorts and police assistance for meeting any untoward situation which might arise. The Committee would recommend the resurrection of such operations under 'Code' names after due preparations for the vulnerable sections of Bihar, Eastern and Western U.P., upper Madhya Pradesh and West Bengal and other bad areas.

#### 8.0. Steps taken to combat ticketless travel.

##### 8.1. The following strategy is being adopted :

1. The minimum penalty from ticketless travel with effect from 10-6-1969 has been enhanced from Rs. 0.50 to Rs. 10.00 under Section 112 of the Indian Railways Act.
2. The Railways are organising checks against ticketless travel with the help of RPF and GRP and Railway Magistrates by 'ambushing' trains.
3. Squad working of TTEs has been ensured to reduce the chance of exposure of single TTE to unlawful elements.
4. A system of awards and punishments for ticket checking staff has been instituted.
5. The services of volunteers and social service organisations are taken to act only as human fencing and not for actual checking.
6. Services of retired and serving railway officers are employed for delivering lectures in educational institutions.



7. Suitable publicity is undertaken in the Press to act as a deterrent.

8.2. Repeated issue of instructions and circulars is not likely to be much help. The practice of enlisting help of voluntary social service organisations may also not prove to be very helpful, particularly where law and order situation itself is weak. It is, therefore, necessary to chalk out a pervasive strategy to handle the menace. The issues that have to be faced are :

1. To adequately equip the ticket checking staff for massive checks
2. To arrange sufficient escorts of Civil police and/or RPF.
3. To ensure that deterrent punishments are meted out to persons caught travelling without ticket, along with a reformatory strategy for students.

8.3 These issues are discussed below.—

#### 9.0 Equipping the Ticket Checking Staff.

9.1. A case exists for reassessing the adequacy of TTEs, which has been depleted, inter alia, a to man sleeper coaches. This would have to be calculated on the basis of the number of squads to be created. The concept being suggested is of a group activity and, therefore, the staff strength should be in conformity with the decision on the groups.

9.2. Individual TTEs, however, will have to be allowed for upper classes, where usually people travel on reservation, or for fully reserved trains. It is understood that the Board have already attached second class bogies for non reserved accommodation on all trains and therefore, a fully reserved train no more exists except the Rajdhani type of fast trains. However, checking will have to be done for reserved compartments for which individual TTEs would be required.

9.3. An allied issue is regarding the existing arrangements at major stations for entry and exit of passengers, where checking is done by the ticket collectors. The Committee consider that the existing arrangements are not satisfactory. Additional exists have to provide along with additional staff to facilitate the egress of the travelling public, and to check their tickets. It is a common experience in major cities that there is a melee at the exist gate and it is just not possible for a ticket collector to check and collect all the tickets and to detect and catch people without tickets, as a sizeable crowd surges outside through a small door. Plurality of gates with staff would have to be arranged specially on station which have large traffic.

#### 10.0 Arrangement for sufficient escorts.

10.1. The entire canvas of GRP/district and RPF has to be considered. Admittedly, GRP has proved to be ineffective and has in many areas forfeited the confidence of the Railway administration. In later chapter, we have recommended merger of GRP with the district police. The RPF has also not proved satisfactory. It is associated in such activities, but is not equipped with powers under the law to deal with riotous assemblies etc., which we have seen, is a frequent occurrence in such cases. Concerted drives in future must be done in a manner that would not expose the Railway personnel to any danger and the people travelling without ticket are not able to hold the administration to ransom.

10.2. The Committee have already recommended earlier in the Chapter that checks on the pattern of Operation 'Barauni' should be adopted as a philosophy of operation. We feel that such checks should be conducted extensively with the aid of the District Police. For this purpose, separate and distinct squads of district police should be created at the expense of Railways. District Police, however, require to be supplemented by RPF to the extent found necessary, particularly in the year of take-off of these 'operations'. The Railway should provide clear-cut executive instructions that RPF would be made available to the extent required and placed at the disposal of Commercial Officers in charge of such ticket checking drives and operations. In this case, the RPF will have to be provided with adequate powers legally to deal with problems arising out of assemblies turning violent or riotous.

10.3. Senior Police Officers have indicated that persons indulging in ticketless travel can easily be identified by the Civil Police. Normally, the leaders are only a few and if they are tackled, the improvement should be immediate. The resources intelligence and information required for doing this are at the command of the Civil Police only as they can keep a watch on the activities of the people even outside the railway premises. We, therefore, feel that the correct solution would be to seek the aid of the Civil Police for checking this menace.

10.4. The Committee have been advised that an experiment was carried out in U.P. in 1948-50, when a force for ticket checking was created. In all 13 platoons were earmarked and they functioned under the superintendence of the Railway Police. The system faded out because of financial difficulties. The ideal solution, as discussed in the preceding paragraph, would be for the States to create a number of squads which could be associated with ticket checking activities on a permanent basis. We recommend this for implementation in the States of Bihar, Uttar Pradesh, Madhya Pradesh and West Bengal of on the North Eastern, Eastern, South Eastern, Central and Northern Railway.

10.5. As a gesture, the Railways should make arrangements for issue of monthly season tickets for regular travellers and students, during a raid, with the provision that if such tickets are purchased for six months, the persons will not be prosecuted. This may have a reformatory effect in the long run and is certainly bound to cover people who are desirous of purchasing tickets, but do not do so because of reluctance, misguidance or bravado. Such a system was tried in certain checks in 1970 for students and was found useful.

#### 11.0. Profile of future operations,

11.1. We recommend that the strategy of having extensive operation in the vulnerable areas of the Indian Railways on the pattern of 'Operation Barauni, should in the first instance be taken up for twenty four calendar months. While we have separately recommended that the Railways should be divested of sharing 50 per cent cost of the GRP, this being an anachronism, we want to emphasise that the initiative for the creation of these Companies for organising massive and repeated raids on bastions of ticketless travelling will have to be taken both administratively and financially by the Railway them-

11.2. The Railway will also have to provide for adequate number of Travelling Ticket Examiners, Ticket Checking Inspectors and Commercial Officers. Appro-



priate arrangements for road transport and such other facilities for conducting quick, decisive and cross-country checks would also have to be provided for by the Railways.

11.3. As we have already indicated, this experiment should consist of repetitive raids in all the vulnerable packets of ticketless travelling in the States and Railways indicated above in paragraph 10.4 over a period of twenty-four calendar months. The matter should be reviewed after twenty-four calendar months. If at that time it is seen that the experiment has yielded sufficient dividends it should be continued for a further period until normalcy is restored.

#### 12.0. Deterrent punishments : amendments to the Law.

12.1. We feel that the punishments prescribed in the Indian Railways Act 1890, Sections 112 and 113 for travelling without ticket are not adequate deterrents.

12.2. Section 112 provides for imprisonment for a term which may extend to three months or with fine which should not be less than Rs. 10 but which may extend to Rs. 500 in addition to the excess charge for the distance travelled.

12.3. Section 113 of the Indian Railway Act provides for the recovery of the fare due and in default of payment imprisonment not exceeding one month. Section 113 B permits additionally, in the case of conviction of habitual offenders under Section 112 or under Section 113, execution of bond for good behaviour for a period not exceeding three years.

12.4. It would be seen that the minimum punishment under Section 112 is Rs. 10 only. In addition offences under Section 112 although cognizable continue to be a bailable offence. An allied offence is improper travelling on the roof of a train or coach or in any other unconventional place which is punishable under Section 118 with imprisonment not exceeding three months and fine not exceeding Rs. 150. This offence is non-cognizable. Similarly causing nuisance within a railway train or in railway premises is punishable under Section 126 with a fine not exceeding Rs. 50. This offence is again cognizable but bailable.

12.5. We feel that at it is essential to make the practice of travelling without ticket a highly losing proposition for the offender. The present minima and maxima punishments prescribed under the law are not considered by us as adequate deterrents. We, therefore, recommend that the minimum and maximum punishments for travelling without ticket or with improper ticket and for such other ancillary, fraudulent, irregular and unlawful practices should be raised to Rs. 200 and Rs. 1,000 respectively in addition to or in substitution thereof of the punishment of imprisonment already provided therein.

#### 13.0. Action programme.

13.1. The committee suggest the following plan of action :

1. A full-fledged Directorate should be created in the Board for dealing with ticket checking, alarm chain pulling and other allied problems.
2. Concerted drives should be arranged against ticketless travel on the pattern of 'Operation Barauni'.

3. Such drives should be conducted with the aid of the Civil Police and when such aid is not available, with RPF, RPSF or such other force or by a combination of more than one force.
4. The RPF should be strengthened for this purpose and the Railway Board should decide on the adequacy of its manpower requirements.
5. A uniform procedure should be established for sharing of the cost of magistracy, their staff and the police force attached to them applicable to all the States. The Committee recommend a sharing between the States and the Railways on 50 per cent basis. This will ensure the involvement of both the Railways and the States. Any deviation can have a deleterious effect on the deployment of staff and intensity of raids.
6. A uniform procedure should be laid down regarding judicial fines received as a result of ticketless checks. This should go entirely to the State exchequers, while Railways dues should go in entirety to the Railways.
7. Along with the drive, arrangements should be made for issue of six monthly season tickets during the raids.
8. At the request of the Railways, the State Governments should post the requisite number of Executive Magistrates for being exclusively deployed on ticket checking activities and operations and also for trying the delinquents.

#### 14.0. Conclusions.

14.1. Ticketless travel has assumed the proportions of a veritable menace. It has to be encountered by massive ticket-checking activities. For this purpose, special ticket-checking squads along with supporting infrastructure have to be set up. These have to draw heavily on the aid of the Civil Police for which a conscious rapport with the Civil Administration has to be maintained by railway officers at various levels. The RPF, at the same time, has also to be strengthened suitably for being associated with such checks if found necessary.

14.2. The RPF has to be vested with powers to deal with law and order problems that are likely to arise during such raids and operations.

14.3. The State Governments have to be asked to create posts of Executive Magistrates at the expense of the Railways who can devote themselves to such works on an exclusive basis.

14.4. Penalty for travelling without ticket has to be made stringent and a minimum fine of Rs. 200 and a maximum of Rs. 1,000 prescribed to act as a sufficient deterrent in addition to or in substitution thereof of the punishment of imprisonment already provided therein.

#### TICKETLESS TRAVEL

##### Views of Shri V.P. Sawhney

On paras 6.5, 11.3 and 13.1 (1)

A full fledged Directorate is proposed to be set up for a period of two years in the first instance to deal with all matters pertaining to ticketless travel and interference with train running.



Earlier the Cell in the Board was set up only for a specific purpose and for a limited period. After a time such highly centralised checks become counter-productive and unprofitable and hence have to be discontinued.

Ticketless checks etc. are field activities and each Railway is best suited to handle them effectively. They have the manpower and the infrastructure for close coordination with the State authorities. They know how, where and when to exercise the checks. Creation of a separate Directorate in the Board would simply over-centralise an activity, which should be normally performed by the Railways. A directorate would merely make the Board further top heavy. The Director (Tourism) should continue to deal with this subject. However, organisation both in the Railway Headquarters as well as Divisional Headquarters needs to be suitably strengthened and streamlined. This should be easily feasible considering that for commercial work, there are three Heads of Department at the zonal level and on the Division there are ADRMs. The Board should merely confine its activities to policy-making coordination and inter Railway checks and compilation of statistical data on account of ticketless travel etc.

#### ANNEXURE A.2.1.

(Cf. Para 1.5).

#### Cases of assault on Ticket Checking Staff on North Eastern Railway within Bihar

1979

- 11-5-79 The TTI/TTEs working 328 Dn. train were badly assaulted by the Police of Madhubani Police Line who wanted to carry persons without any authority in First Class.
- 21-11-79 During the Bus Raids by Samastipur Raiding Party on Jayanti Janata Express at Pitaunja station, some students of Buxar Ayurvedic College man-handled the staff.
- 23-11-79 While checking 31 Up train between Goldenganj and Chupra, the students assaulted the ACS/Sonpur and caused fracture to his wrist. The culprits escaped in spite of chase.
- 11-12-79 During the course of check of 421 Up train at Mehtai station a mob of about 1000 persons attacked the Raiding Party and forcibly took away the apprehended persons and a pair of handcuffs along with prisoner's rope. 11 GRP/RPF personnel were injured.

1980

- 20-2-80 During the course of Magisterial check of 78 Up and 606 Dn. trains at Riga station the passengers turned into a violent mob and became uncontrollable.—The Magistrate ordered Lathi-charge and two rounds of blank fire and after which the mob came into control.

1982

- 28-4-82 In course of a Special drive against ticketless travel between Muzaffarpur-Narkatiaganj under 'Bihar Operation', 40 persons including 12 students were apprehended and convicted. This led to the assembly of an infuriated mob of about 4000 people who gheraoed the station building, pelted stones, set fire to the checking bus and damaged the Railway property. The Railway Magistrate had to order lathi-charge and then firing to control the situation resulting in death of 3 persons and injury to one.
- 25-6-82 Shri T.N. Das, TTE/Gorakhpur (East) was badly assaulted at Chupra for disallowing some persons to travel without tickets in Air-conditioned Sleeper Coach.
- 5-8-82 In course of a magisterial raid on 405 Up train at Panchgachia station heavy brick-batting was resorted to by students resulting in damage to station building and records apart from injuries to the Station Master.

In order to control the situation the Railway Magistrate ordered three rounds of fire. None, however, was injured in the firing.

#### Cases of assault on ticket Checking Staff on North Eastern Railway in Uttar Pradesh.

1979

- 15-1-79 During course of checks of 256 Dn. train between Rajatalab and Nigatpur Sections a huge mob surrounded the train and started brick-batting in which the Police staff and the checking staff were seriously injured. The whole train and the Roadways buses were badly damaged.
- 18-4-79 During the course of checks at Gorakhpur Station Shri Daya Shankar Dayal, TTI was assaulted by students.
- 11-12-79 During the course of check of 288 Dn. Train at Kaptanganj station, students man-handled with, intimidated and threatened the ACO (TC)/II, and other staff they snatched away his wrist watch and assaulted the staff.

1980

- 7-2-80 As a result of check of 37 Up and 49 Up trains at Sarnath 16 persons reportedly of Kashi Vidya were apprehended. A mob of students of the said institution raided the office at about 12.30 hrs. and damaged the furniture and the glass-panes of the office. On the intervention of Police, the mob dispersed and some of the persons were taken into custody by the police.

- 23-2-80 As a result of some dispute between GRP staff on escort duty and students regarding entrance into a compartment at Bindaura station the GRP staff opened fire in which one student got injury.

- 29-3-80 Between Lucknow Jn. and Aishbagh stations the TTE working on sleeper coach by 10 Dn. train was badly assaulted by the students who wanted unauthorised entry in the Sleeper Coach.

- 11-7-80 During a Bus Raid with base at Mau Jn. on Bhatni-Varanasi Section of Varanasi Division 73 persons were apprehended and kept for trial. Some miscreants including students surrounded the station premises and broke window glasses of the buses engaged for Ticket Checking Drive. The situation was anyhow controlled and further checking programme had to be abandoned.

- 16-12-80 When 256 Dn. train was checked between Sadat and Hurmuzpur Halt on Mau Jn.-Aunrihar Jn. Section of Varanasi Division, an unruly mob of more than 1000 persons gheraoed the checking party and started brick-batting. As per orders of Executive Magistrate accompanying the checking party, all the accused persons had to be released and Police had to resort to lathi-charge to control the mob.

- 17-12-80 The next day the same train was re-checked almost at the same spot under the supervision of Sr. DCS/Varanasi, Dy. S.P. and Executive Magistrate from Ghazipur District and all the persons apprehended were prosecuted and convicted. On that day again the Police had to resort to lathi-charge.

- 22-12-80 Shri Syed Ashan Raza, TTE of Lucknow Division was assaulted while working in Sleeper Coach by 15 Up on 22-12-80 by two passengers travelling without ticket in his Coach.

1981

- 26-3-81 Shri S.N. Shukla, TTE/Allahabad City while he was on duty by 6 Dn. Train of 26-3-81 ex. Allahabad City to Varanasi was misbehaved and assaulted by one Shri Ramji Rai a Clerk of Registrar Co-operative Office, Durgakund, Varanasi at the Railway Platform of Varanasi. Reasons therefore was an old enmity as he was previously charged by Shri Shukla. FIR No. 146, dated 26-3-81 was lodged at GRP/Varanasi and Report sent to DIG (Railways), Allahabad on 27-7-81 for necessary action.

- 6-4-81 Shri K.B. Shukla, TTE/BSB was badly assaulted at the Platform of Varanasi while he was working by



	<i>Railway</i>	<i>Section</i>
6 Dn. on 6-4-81 ex. Allahabad City to Varanasi by the miscreants as stated by Shri Shukla. Three passengers who desired to travel in his 3-tier Sleeper Coach without paying the surcharge, were not allowed by him. Consequently the TTE was assaulted by them at Varanasi. The matter was reported to SP (Railways) Allahabad on 6-4-81.	South Eastern	Waltair-Vizianagram Vizianagram-Raygada
6-5-81 Shri M.U. Siddique, TTE, CCS's Squad No. 3/Gorakhpur was assaulted by Shri Kumar holder of MST No. 02232 ex.-Varanasi to Allahabad City and his companion while working 6 Dn. train at Bhulanpur Halt station for charging his excess luggage. GRP/Varanasi did not register his FIR.	South Central	Kazipet-Vijayawada Guntur-Macherla Dronachellam-Donakonda
The matter has been reported to Superintendent of Police/Railways, Allahabad demi-officially for necessary action.	Eastern	<b>BIHAR</b> Sahibganj-Kiul Bhgalpur-Mandar Hill Tinpahar-Rajmahal Jamalpur-Monghyr Madhupur-Giridih Jasidih-Baidyanathdham Gomoh-Berwadih Daltonganj-Garwa Road Dhanbad-Pathardih Patna-Gaya Kiul-Gaya Bakhtiarpur-Rajgir Dehri-on-Sone-Garwa Road Dildarnagar-Tarighat
7-5-81 Shri M.K. Chakravarty, TTE/BSB while coming on duty by 72 Dn. train on 7-5-81 ex.-Allahabad City to Varanasi was badly assaulted by a group of miscreants near Handiakhas. The TTE was therefore brought to Varanasi and admitted in the Railway Hospital/Varanasi. The matter was reported to SP (Railways) Allahabad on 4-6-1981.	North Eastern	Siwan-Chapra Sidhawali-Hathua Thawe-Ramkola Chapra-Rajapatti Darbhanga-Nirmali-Sitamarhi Narkatiaganj-Bhiknathori-Bagaha-Raxaul Muzaffarpur-Samastipur Samastipur-Khagaria via Hassanpur Road Samastipur-Barouni Jn. Mansi-Saharsa-Sapaul Saharsa-Bunamkhi-Bihariganj Sonpur-Chapra Thanabihpur-Mansi Katihar-Manihari Ghat Katihar-Jogbani Katihar-Kumedpur
26-6-81 Shri S.N. Shukla, TTE/Allahabad City was on duty ex. Allahabad City to Varanasi by 6 Dn. on 26-6-81. A passenger was charged by him at Madhosingh alongwith Sardar Hussain, a constable of PAC. He was asked to return his charged amount of Rs. 9.10. On refusal, the passenger assaulted him and fled away. FIR was accordingly lodged with GRP/BSB on 26-6-81. Matter was also reported to DIG (Railways)/Allahabad for necessary action on 22-7-81.	South Eastern	Rajkharwan-Gua Ranchi-Johardaga Hatia-Nawagaon Muri-Barkakana
30-7-81 Shri Naubat Ram, DTT/BSB alongwith Raiding Party checked IInd Class compartment of 6 Dn. train on 30-7-81 which was occupied by the GRP personnels. 8 without ticket passengers with 2 big unbooked bundles weighing 150 kgs. were detected and charged under TTE-1 No. 356236/38 and 167605/07. On departure of the train, five constables of GRP/TTP/BCY threatened to assault him. The matter was reported to SP (Railways) Gorakhpur on 4-8-1981.	Northern	<b>U.T. of DELHI</b> Delhi Ghaziabad Delhi-Narela Delhi-Ghevra Delhi-Tughlakabad Delhi-Bajwasan
05-7-82 Shri S.B. Misra, TTE/Varanasi was manning Sleeper Coach No. 1676 of 16 Dn. train on 5-7-82 ex.-Varanasi. At Ballia some persons entered into the coach and enquired about the advance reservation from Ballia for Gauhati. On receiving a negative reply from the aforesaid TTE they dragged him out of the coach and badly assaulted him. Some G.R.P. personnel came to his rescue and saved him. The coach had to go unmanned from Ballia onwards.	Northern	<b>HARYANA</b> Bijwasan-Rewari Garhi Harsaru-Farrukh Nagar Rewari-Hissar Narela-Panipat
01-9-82 While Shri Om Prakash Shukla, TC/Bhatni was going to affix the reservation charts on respective coaches of Triveni Express on 1-9-82 at Bhatni, some 4 to 5 persons came to him and wanted to stop him from doing the same as they wanted some reservation to be done.	Central	Delhi-Kosikalan
Shri Shukla advised them to contact the TTEs who would be manning the coaches for getting reservations, but they became furious and beat him and he had to get himself admitted in the Central Railway Hospital, Gorakhpur on the advice of local Doctor. He had also given a report to the S.H.O./GRP/Bhatni for lodging the FIR.	Southern	<b>KARNATAKA</b> Bangalore City-Dharmavaram Birur-Talguppa Bangrapet-Marikuppam
<i>Annexure A2.2.</i>	South Central	Gadag-Bijapur
<i>(Cf. Para 5.1)</i>	Southern	<b>KERALA</b> Coimbatore-Shoranur Shoranur-Cochin Harbour Terminus
<b>Vulnerable sections where ticketless travel is rampant</b>	South Eastern	<b>MADHYA PRADESH</b> Bilaspur-Katni Anuppur-Chirmiri Raipur-Dhamtari Bhilai-Dalli Rajhara Raipur-Dongargarh Chhindwara-Seoni Gondia-Balaghat
<i>Railway</i>	Central	Khandwa-Itarsi Vidisha-Itarsi Amla-Parasia Satna-Manikpur (Excl.) Bina-Katni
<b>ASSAM</b>	Western	Indore-Mhow
N.F. Railway Chaparmukh-Mairabari Badarpur-Silchar Jorhat Town-Furkating Rangapara-North-North Lakhimpur- Murkongselek. Rangiya-Rangapara North		
<b>ANDHRA PRADESH</b>		
<b>NIL</b>		



<u>Railway</u>	<u>Section</u>	<u>Railway</u>	<u>Section</u>
<b>MAHARASHTRA</b>			
South Eastern	Nagpur-Nagbhir Nagpur-Tumsar Tumsar-Tirodi Gondia-Chanda Fort		Unnao-Unchahar-Phaphamau Lucknow-Belmau Balamau-Unnao Shahjahanpur-Sirapur Bareilly-Chandausi Chandausi-Moradabad Chandausi-Aligarh Moradabad-Saharanpur Najibabad-Gajraula Meerut City-Hapur-Khurja Rishikesh-Raiwala Ghaziabad-Meerut City-Saharanpur Ghaziabad-Dankaur-Khurja Tundla-Agra Burban-Etah Farrukhabad-Shikohabad Tundla-Kanpur Central Kanpur Central-Allahabad Allahabad-Chunar
Central	Pune-Lonavala Kalyan-Karjat Karjat-Khopoli Manmad-Igatpuri Badnera-Amravati Khamgaon-Jalamb Murtajapur-Yavatmal		
South Central	Parli Baijnath-Udgir		
<b>ORISSA</b>			
South Eastern	Cuttack-Talcher Khurda Road-Ichchapuram Cuttack-Puri Rourkela-Jharsuguda Raygada-Kharia Road Sambalpur-Titlagarh	North Eastern	Moradabad-Lalkua-Ramnagar Bilaspur-Shahjahanpur Gonda-Gorakhpur (Loop) Deoria Sadar-Bhatpar Rani Bhatni-Barhaj Bazar Indara-Dhori Ghat Ballia-Shahganj Farrukhabad-Kasganj Khalilabad-Gorakhpur Sitapur-Burhwal Gonda-Nanpara
<b>PUNJAB</b>			
Northern	Sirhind-Ludhiana Ludhiana-Jullundur City		
<b>RAJASTHAN</b>			
Central	Dholpur-Tantpur	Central	Orai-Kanpur Jhansi-Kanpur Jhansi-Banda Banda-Manikpur Mathura-Kosi Kalan Manikpur-Allahabad
Western	Sikar-Churu Sikar-Loharu		
<b>TAMIL NADU</b>			
Southern	Jolarpettai-Erode Tiruchchirappalli-Madurai Madurai-Bodinayakanur Villipuram-Tiruchchirappalli (Chord) Vriddhachalam-Cuddalore Jn. Vriddhachalam-Salem Peralam-Karaikal	Eastern	Ranaghat-Lalgola Sealdah-Central (Suburban) Sealdah-Southern (Suburban) Barasat-Hasnabad Shantipur-Krishnanagar City-Nabadwip Ghat
<b>UTTAR PRADESH</b>			
Northern	Varanasi-Faizabad Jaunpur-Allahabad Akbarpur-Tanda Faizabad-Lucknow Faizabad-Allahabad Lucknow-Kanpur Central (India).	Northeast Frontier	Alipurduar-Bamanhat Jalpaiguri-Haldibari Kumedpur-Malda Town Barsol-Radhikapur
		South Eastern	Howrah-Kharagpur Adra-Asansol Bankura-Rainagar

Annexure A.2.3.  
(Cf. Para 6.7.)

Present practice in regard to apportionment of the cost of the Magistrates, their court staff and the Police Force attached to them and crediting of Judicial Fines.

<u>State</u>	<u>Cost of Magistrates and their staff</u>	<u>Cost of Police Force</u>	<u>Allocation of Judicial Fine</u>
Assam	Entire cost borne by the Railway	Entire cost borne by Railway	Credited to the Railway
Bihar	50% of cost borne by Railway and 50% by State Government.	Entire cost borne by Railway	Credited to the State Government
Gujarat	Entire cost borne by the State Government	Entire cost borne by Railway	Credited to the State Government.
Haryana	Entire cost borne by the Railway	Entire cost borne by the Railway	Credited to the State Government
<b>Madhya Pradesh—</b>			
(i) S.E. Rly.	50% of cost borne by Railway and 50% by State Government.	Entire cost borne by Railway	Credited to the State Government
(ii) C. Rly.	50% of cost borne by Railway and 50% by State Government.	50% of cost borne by Railway and 50% by State Government.	Credited to the State Government
<b>Maharashtra—</b>			
(i) C. Rly., S.C. Rly. & W. Rly. portion.	Entire cost borne by State Government	Entire cost borne by Railway	Credited to the State Government
(ii) S.E. Rly. portion	Entire cost borne by State Government	No special Police Force attached to the Magistrate.	Credited to the State Government
Orissa	50% of cost borne by Railways and 50% by the State Govt.	Entire cost borne by Railway	Credited to the State Govt.



State	Cost of Magistrate and their staff	Cost of Police Force	Allocation of Judicial Time
Punjab	Entire cost borne by Railway	Entire cost borne by Railway	Credited to the Railway to the extent of cost borne.
Rajasthan	Entire cost borne by State Government	No Special Police Force attached to the Magistrates.	Credited to the State Government
<b>West Bengal—</b>			
(i) E. Rly. portion	Entire cost borne by State Government	Entire cost borne by Railway	Credited to the State Government
(ii) N.F. Rly. and S.E. Rly. portion.	50% of the cost borne by Railway and 50% by State Government.	Entire cost borne by Railway	Credited to the State Government
Delhi	Entire cost borne by the Railway	Entire cost borne by Railway	Credited to the Railways
Andhra Pradesh	Entire cost to be borne by Railway	Entire cost to be borne by Railway	To be credited to the Railway
Karnataka	50% of the cost borne by Railway and 50% by State Government.	No special Police Force attached to the Magistrates.	Credited to the State Government
Kerala	Since the Magistrates are honorary, only their TA/DA and cost of the Court is borne by the Railway.	No special Police Force attached to the Magistrates.	Credited to the State Government
Tamil Nadu	Entire cost borne by Railway	No special Police Force attached to the Magistrates.	Credited to the Railway
Uttar Pradesh	50% of cost borne by Railway and 50% by State Government.	Entire cost borne by Railway	Credited to the State Government





## CHAPTER III

### INTERFERENCE WITH THE RUNNING OF TRAINS

#### 1.0. Misuse of alarm chain apparatus.—

1.1. The alarm chain communication has been provided on passenger-carrying trains to be used by bonafide passengers for stopping trains during an emergency. Unfortunately, almost 98 per cent of alarm chain pulling cases, according to available statistics, are unauthorised. The figures are indicated in Table 3.1.

Table 3.1  
Incidence of unauthorised alarm chain pulling

Year	Total No. of incidents of A.C.P.	Total No. of ACP incidents not justified	Percentage
1978-79	1,81,656	1,76,227	97.01
1979-80	2,54,221	2,28,164	80.27
1980-81	2,90,057	2,88,040	99.30
1981-82	2,43,696	2,39,438	98.25

1.2. The incidence of alarm chain pulling has been studied Railway-wise and is indicated in Table 3.2.

Table 3.2  
Railway-wise statement of incidence of alarm chain pulling

Railways	1978-79	1979-80	1980-81	1981-82
Central	20,190	26,543	32,667	35,235
Eastern	5,965	6,738	6,737	6,958
Northern	40,266	45,951	45,926	36,535
North Eastern	38,310	63,009	75,765	80,968
Northeast Frontier	5,484	6,665	5,996	3,275
Southern	8,288	10,241	9,040	5,367
South Central	28,369	45,986	46,537	22,632
South Eastern	18,656	29,351	44,745	38,163
Western	16,138	19,737	22,644	14,563
Total	1,81,656	2,54,221	2,90,057	2,43,696

1.3. The Railways most affected are North Eastern, South Eastern, Northern and Central. North Eastern Railway is most notorious for alarm chain pulling. The incidence shows a continuous increase over the years on North Eastern and Central Railways. On other Railways, there is a decline in 1981-82. This may be only a flash in the pan, and in any case there is no improvement in the 'hard-core' Railways.

1.4. As alarm chain pulling has an interface with the law and order situation, its ramifications have necessarily to be studied state-wise.

Table 3.3

#### State-wise incidence of alarm chain pulling

States	1978-79	1979-80	1980-81	1981-82
1. Andhra Pradesh	23,418	41,822	43,106	20,701
2. Assam	1,019	1,734	2,894	1,288
3. Bihar	18,918	26,833	29,720	41,121
4. Delhi	2,921	3,561	3,861	4,862
5. Gujarat	2,169	2,128	2,125	2,897
6. Haryana	6,070	7,465	7,633	8,840
7. J.&K.	61	74	66	29
8. Karnataka	1,958	4,095	3,575	2,818
9. Kerala	1,473	1,425	1,397	1,377
10. Madhya Pradesh	19,698	25,604	39,548	35,146
11. Maharashtra	11,691	12,937	12,535	9,091
12. Orissa	7,491	14,400	19,511	11,904
13. Punjab	2,682	3,271	2,563	1,544
14. Rajasthan	8,859	10,456	10,602	7,921
15. Tamilnadu	5,782	7,280	6,103	3,633
16. U.P.	62,037	84,318	95,575	79,470
17. West Bengal	5,409	6,818	9,443	10,951
18. Nagaland	...	...	...	103
Total	1,81,656	2,54,221	2,90,057	2,43,696

1.5. The notorious States in this respect are in the following order :

1. Uttar Pradesh
2. Bihar
3. Madhya Pradesh
4. Andhra Pradesh
5. Orissa
6. West Bengal

1.6. The worst affected States are U.P. and Bihar. The Railways, which cover U.P. and Bihar, are Northern, North Eastern, Central, Eastern and South Eastern. The menace of alarm chain pulling is evidently pronounced in the Northern and North Eastern regions. It, therefore, became imperative to collect some data for these two States, particularly from North Eastern Railway, which is indicated in Table 3.4.



Table 3.4

Incidence of alarm chain pulling (and time lost thereby) for U.P. and Bihar States covered by North Eastern Railway only

Year	U.P.		Bihar		Grand Total	
	Cases	Time lost (in hrs.)	Cases	Time lost (in hrs.)	Cases	Time lost (in hrs.)
1977	4,877	592.28	4,888	685.2	9,765	1,277.40
1978	21,015	2,678.21	9,413	1,270.54	30,428	3,949.15
1979	41,983	5,322.27	15,435	2,008.14	57,418	7,330.41
1980	55,311	6,409.24	20,843	2,517.26	76,154	8,926.50
1981*	52,823	5,909.00	31,464	3,268.00	84,287	9,177.00

These two States require high concentrated efforts. It would be important to sustain the drives over a period combined with ticket checking at frequent intervals to have a lasting impact.

#### 2.0. Disconnection of hose-pipe.

2.1. The Railways are equipped with statutory powers for blanking off the alarm chain apparatus to prevent its misuse. However, experience indicates that this recourse is only on paper as the miscreants indulging in the alarm chain pulling have also graduated to stopping the trains by disconnecting the hose-pipes. Table 3.5 indicates figures for States having frequent hose-pipe disconnections :

Table 3.5

#### Cases of hose-pipe disconnection

States	1979-1980	1980-81	1981-1982
1. U.P.	53,146	69,437	61,649
2. Bihar	17,111	20,574	20,971
3. West Bengal	5,476	9,369	15,265
4. Maharashtra	330	488	1,015
5. Madhya Pradesh	18	63	234
6. Andhra Pradesh	144	231	267
Total	76,225	1,00,162	99,401

2.2. The above figures indicate a daily average of about 275 cases. The problem of alarm chain pulling has, therefore, to be looked alongwith that of disconnecting of hose-pipes. The evil has become organised and groups of people indulge un-hesitatingly in stopping trains to alight at a point of convenience to them, or for limited periods by taking away the hose-pipes, again to suit their personal conveniences. The common culprits, who have been identified by experience as indulging in this menace, are industrial workers, milk vendors, students and office workers.

#### 3.0. Effect on the movement of traffic.

3.1. One of the factors impeding punctuality performance on the Railways is the menace of alarm chain pulling and hose-pipe disconnections, which has assumed

serious proportion on North Eastern Railway, and parts of Northern, Eastern and Central Railways. As already indicated in paragraph 2.3, Chapter IV in Part II of the Report†, pulling of alarm chain takes around 20 per cent toll of punctuality. The resultant interferences also affect the movement of goods trains.

3.2. The loss of capacity and the slowing down of the freight movement unleashes a chain reaction, resulting in increased working expenses, particularly in the payment of overtime and consumption of fuel and above all, destroys the initiative of the running staff to ensure fast movement. The menace of alarm chain pulling and hose-pipe disconnection has to be energetically tackled.

#### 4.0. Provisions under the Railway Act.

4.1. Alarm chain pulling without adequate reasons is a cognisable offence under the Indian Railways Act 1890. The punishment prescribed is a maximum of Rs. 250 in fine and a maximum of three months' imprisonment or both. Earlier, the fine provided for unauthorised chain pulling was Rs. 50, which was increased in 1959 to Rs. 250.

4.2. It is necessary to indicate that prescribing a larger punishment only offers a partial solution to the problem as it exists today, though it should be considered as a step in the right direction. This is primarily because the hard-core offender is rarely caught and convicted. If there is no system or the existing system fails in catching the culprit, either for disconnecting the hose-pipe or for pulling the alarm chain, even enhanced punishment would not meet the requirements.

4.3. The problem gets aggravated because of the social environment in which the public seldom come forward in apprehending the defaulter even when the offence was committed before their very eyes. Yet another dimension is introduced by the usually nominal punishments imposed on offenders when they are apprehended and convicted. Some idea can be had from the figures given in Table 3.6.

Table 3.6

Year	Total No. of Alarm Chain Pulling incidents	Total No. of Alarm Chain Pulling incidents not justified	Total No. of special checks conducted	No. of persons		
				Detected pulling ACP	Arrested	Prosecuted
1978-79	181,656	176,227	26,944	384	345	384
1979-80	254,221	228,164	37,322	685	603	615
1980-81	290,057	288,040	42,096	553	553	553
1981-82	243,696	239,438	44,179	780	779	779
Average per month in 1981-82.	20,308	19,953	3,682	65	64.9	64.9

4.4. The number of persons detected bears no relation to the incidence of alarm chain pullings. Obviously the existing system on the Railways for apprehending the offenders is not a success. This is largely due to the reluctance to catch the rowdy or hard-core elements, who indulge in such nefarious activities with

\* Figures of 1981 are provisional.

† Pages 72-73 Part II.



impunity and the unwillingness of the GRP and the States to tackle this problem on a serious basis. Whatever prosecution or apprehension of offenders is achieved it is only during the time of special checks.

#### 5.0. A strategy.

5.1. The ticket checking activities have to be combined with checks on other unauthorised activities, be it by way of alarm chain pulling or hose-pipe disconnection. These drives are conducted by the Commercial Department with the assistance of the Civil Polices, RPF, RPSF at all. According to the RPF Regulation\* one of the functions of RPF is to assist the Traffic Department in checking ticketless travellers or in the prevention of breach of the provisions of the Indian Railways Act.

5.2. We have made detailed recommendations while dealing with the drives and operations against ticketless travelling in Chapter II from paragraph 6.5 to 12.5 and would reiterate that all these suggestions would apply *mutatis mutandis* in the present situation. The drives and operations envisaged by us in the earlier chapter would not only eradicate such unlawful activities, but also act as deterrents against interference with the running of trains.

5.3. In the light of what has been suggested above and in Chapter II, it is necessary for the Railways to determine the modality of setting up of the organisation in consultation with the States. While this should be determined, the view of the Committee is that in the vulnerable pockets on the Railways mentioned by us in paragraph 5.0 of Chapter II, at least 10 to 12 companies should be constituted for 24 calendar months, 5 for North Eastern, 3 for Northern, 2 for Eastern and 2 for Central Railways.

5.3.1. Increasingly it is becoming evident that special drives are being checkmated by organised resistance at many places, particularly in the vulnerable areas of North Eastern Railway in both Bihar and Uttar Pradesh. This is because of a general deterioration in law and order and a general belief that no effective action can be taken. In this background certain amount of glamour and bravado have come to be attached to such offences. Some people have begun to take pride in travelling without tickets. As the RPF may be used if and when civil police is not available in adequate strength, it would be necessary to train these squads as also to equip them to deal effectively with riotous assemblies and crowd control, as mentioned in Chapter II. These squads can, therefore, be given the normal training, which is extended to a normal police force.

5.3.2. It has been already stated in the earlier Chapter that there is a case for going into the question of TTEs and to create sufficient staff-cover to the extent considered necessary. The squads should be specifically created for ticket checking and alarm chain pulling in the field. These will comprise ticket checking

staff and the district police/RPF and should be placed under at least a Senior Scale Commercial Officer. It should have a complement of at least 50 TTEs. With the suggested composition and intensive usage in vulnerable areas, we feel that it would certainly be possible to cover much more than the cost of these squads by the earning not only from fines etc., but also from a boost of window sales.†

5.3.3. The Railways have indicated that according to the extant instructions of the Board, only one attendant is to look after two sleeper coaches. The Committee consider this to be an unsatisfactory arrangement and recommend that one attendant should be exclusively earmarked for one coach, so that he can be held responsible and cannot easily shift the responsibility by claiming that he was in the other coach.

5.3.4. As already indicated in the earlier chapter, there would be need for frequent exchanges of ticket checking staff so that they are not able to develop any roots by regularly working in a specific area.

5.4. Another change, which has to be contemplated, is in respect of the system of recruitment of Ticket Collectors and Travelling Ticket Examiners. Presently, recruitment is only done in the lowest scale of Ticket Collectors, who, after having done eight to ten years of service, are promoted as TTEs.

5.5. The obvious limitation in the existing system of recruitment is the fact that young people are recruited as Ticket Collectors and by the time they become TTEs, many have been exposed to the wiles of corrupt practices, and many have got over the drive, enthusiasm and initiative of their youthful days. The recruitment rules, therefore, need to be revised to permit TTEs being recruited directly and the channel of promotion revised to ensure so that ticket collectors do not lose their existing chances of promotion.‡

5.6. In this connection, the Committee would like to refer back to Para 7.0 of Chapter II, wherein a recommendation has been made for organising widespread and repetitive network drives like 'Operation Barauni'.

5.7. The Indian Railways Act unfortunately does not as yet provide for adequately deterrent punishments. Under the extant provisions, in a case of alarm chain pulling, hose-pipe disconnection or such other interference with the running of a train, a conviction may extend for the first offence to a fine which should not be less than Rs. 25/-, and for the second or subsequent offence, imprisonment which shall not be less than one month. The maximum punishment is imprisonment for three months or a fine of Rs. 250/- or both. No data bank exists for seeking enhanced punishment for repetitive offences.

5.8. We consider that in the present situation when such unsocial practices by some offenders are holding

\* Railway Protection Force Regulation 1966, Part II, Chapter II, page 4.

† 50 TTEs are required for a 22-coach train for checking, which has to be done quickly, as the intention is not to detain these trains for more than 15 minutes. Two TTEs and in some compartments, three TTEs would be necessary. In addition, for preparing challans and preparing tickets, some additional assistance will have to be provided and 50 is not a big number.

‡ After de-linking of TTEs and TCs, the channel of promotion can be retained by increasing the number of higher percentage posts for the latter category, if necessary. This should, there-

fore, not be difficult. The change being suggested is that instead of ticket collectors becoming TTEs, TTEs would be recruited directly and ticket collectors would become senior ticket collectors.

The other alternative is that presently, only ticket collectors are getting recruited as the TTEs are in a higher grade. If these two grades are combined, the initial recruits could have the choice either to function as ticket collectors or TTEs. In the latter case at first, such recruits will have to function as TTEs and only then on fixed point duties as Ticket Collectors. Whatever system is adopted it has to be ensured that the largest bulk of TTEs are fresh recruits and young in age.



many genuine passengers to ransom and are playing havoc with the running of trains, there is need for more deterrent punishment under the law. We recommend the following punishments :

First Offence	.. A minimum fine of Rs. 250/- and a maximum of Rs. 1,000/- No. imprisonment is recommended for the first offence.
Second or subsequent offence.	.. A minimum fine of Rs. 500/- or an imprisonment for three months or both, and a maximum of Rs. 1,000/- or an imprisonment of six months or both.

5.9. The intensive ticket checking drives by special squads with civil police or RPF assistance, as envisaged in the paragraphs above, has also to be organised with special Railway Magistrates before whom the offenders would have to be produced for trial on the spot or at a nearby place.

5.10. Interestingly, the fines imposed in special checks and ambush raids vary from State to State. Arising out of these checks, railway dues are realised and where dues cannot be paid or there is an intention to travel without ticket, prosecution is arranged, which results in fines. Figures are indicated in Table 3.7.

Table 3.7

Monthly figures of Railway dues and fines realised

Year	Amount of Railway dues realised.	Amount of judicial fines realised
	Rs.	Rs.
1978-79	2,544,619	1,38,876
1979-80	2,765,812	1,93,082
1980-81	3,396,964	2,40,252

5.11. The existing provisions permit the Railways giving an award of Rs. 100 to the persons assisting in apprehending the culprits indulging in alarm chain pulling. The response of the public is more or less non-existent. The Committee feel that the powers should be vested with the Senior Divisional Commercial Superintendents and the Divisional Railway Managers to reward persons giving valuable information about alarm chain pulling without revealing their identities. These funds should be operated like the funds operated by the Superintendents of Police in the Districts for informers. An amount of Rs. 3,000 could be placed at the disposal of the Senior Divisional Commercial Superintendents of every Division. This may encourage bonafide passengers to give information, which will lead to the apprehension of the culprits without any fear of their identity being known\* The expenditure from this fund may not be subjected

to any audit and account check and the accounts may be seen by the Divisional Railway Manager at the end of the financial year.

5.12. Certain design changes in the coaches are also required. At present, in some coaches it is possible by standing at the door, which is on the ends, to rotate the disc of the clappet valve by stretching the arm. To overcome this difficulty, the entry and exit doors will have to be removed away from the ends.† For ordinary second class coaches, the possibility of putting doors in the middle, which will not permit the passengers to easily reach the clappet valve should be examined. The Committee have already suggested certain design changes in Part II of the Report. These relate to increasing the number of toilets in the second class sleeper and other coaches. It should be possible to incorporate the present design change at the same time. Such coaches should be used first in vulnerable areas.

5.13. Another design change should be examined along with the introduction of air brake system to ensure that the pulling of an alarm chain in a compartment will only act as an indication to the Guard and the Driver, who alone would be in a position to bring the train to a stop. Under these arrangements, the Guard and the Driver can continue with the train journey without stopping it, in which case, an automatic recorder should be provided to indicate the number and time of occurrence, so that scrutiny can be done later. This would imply that the present facility of passengers directly destroying the vacuum would be lost. The trains with the new design should first be tried out in the vulnerable areas.

5.14. The Committee have been advised, particularly by North Eastern Railway, that after the separation of judiciary from the executive in U.P., only Judicial Magistrates who do not have executive powers, are made available and they are only competent to try cases. As against this practice, in Bihar, Executive Magistrates with judicial powers are available. This would mean that whenever special raids are organised, requests have to be made to the State Government for the services of Executive Magistrates as the Judicial Magistrates only hold court. This adds to the delays and generally Executive Magistrates are not available. The Committee would recommend that the State Government adopt a uniform procedure for vesting Railway Magistrates with judicial-cum-executive powers even as an exception. Alternatively only Executive Magistrates with judicial powers should be deployed.

5.15. In the south, these Magistrates are usually re-employed retired officers and generally are not physically in a condition to withstand the rigours of travel or field duties. They also lack drive, enthusiasm and initiative. In the north Indian States, these posts have been made a part of the cadre of judicial Magistrates. We recommend that a uniform system of Special Railway Executive Magistrates with judicial powers being appointed as a part of a regular permanent cadre should be adopted all over the country and the practice of engaging retired officers for this work altogether given up. The State Governments should also arrange the deployment of fresh and young officers for such posts, more so because their duties would involve intensive travel and outdoor responsibilities.

\* Regular travellers are aware of the mischief-mongers, but as they travel daily, nobody is willing to catch the culprit. Incentives may result in getting the informations about these people, who can then be nabbed, by posting police personnel in multi in those compartments to travel alongwith the offenders.

† When a passenger pulls the alarm chain in a compartment it

rotates a rod, which is placed at the external end of the coach on both the sides, thereby permitting air to enter the vacuum pipe. A visual indication is provided by a disc, which is attached and protrudes/rotates. In some coaches, it is possible to reach this rod by standing at the door and to rotate it. Hence, it has been suggested that this design should be changed.



5.16. The above remedial measures have to be combined with the Railways' own efforts to meet and redress the genuine grievances of the travelling public, which is occasionally resulting in the misuse of the alarm chain apparatus. This would imply the Railways having a system of identifying the demands of a particular area and of changing the scheduling of passenger trains to meet justified demands. This will also imply better service being provided by the Railways, particularly in the metropolitan and suburban areas.

5.17. A suggestion has been made that to deal with this menace, volunteers from Railway employees should be drawn to assist the ticket checking staff on holidays or outside office hours by giving them a fixed honorarium. The Railways employ a large number of ministerial staff, who can be associated in such drives. We have been informed that the Central Railway have tried such a scheme with some success. The Committee would recommend its application on a wider scale at east as experimental measure.

5.18. The staff engaged in ticket checking, which incidentally is also the staff dealing with alarm chain pulling and disconnecting of hose-pipe also requires to be given an incentive for better performance than what is being accomplished today. The ticket checking staff can also be extended an incentive of graded honorarium provided a minimum target laid down by the Railway administration is achieved every month.

5.19. The Railways are blanking off the alarm chain apparatus in vulnerable sections, but the present arrangements provide that the apparatus should remain operative in ladies' compartments, postal vans and coaches utilised fully or partly for carrying mails. The miscreants have, therefore, known the methods of stopping a train from these compartments, where this apparatus is functioning. The Committee would recommend that if the Railway administration decides on banking off of the alarm chain apparatus, it must be done on the entire train and no exceptions except for the ladies' compartments be allowed. The Committee, however, realise that this would make a small dent in the problem as the miscreant would then graduate to disconnection of hose-pipes, which has been discussed in the preceding paragraphs.

5.20. As regards blanking off the alarm chain apparatus, the Committee have already made specific recommendation in Part II, Chapter IV, paragraphs 3.1.12 to 3.2 and would reiterate that these should be urgently implemented on a priority.

5.21. In order to effectively tackle the problem of disconnecting of hose-pipes, we would support appointment of an expert group of Railway Officers to find a way, which would make such disconnection a highly difficult proposition, at the same time, maintaining the desired flexibility for the Railways' own operations.

## 6.0. Conclusions.

6.1. There is gross abuse of alarm chain apparatus and disconnection of hose-pipes is also very frequent. The menace has to be tackled by intensive drives, which have to cover both ticket checking alarm chain pulling and disconnecting of hose-pipes. As to the modality, we have made specific recommendations which should be implemented urgently.

6.2. Rotation and exchange of ticket checking staff is essential so that they do not develop any roots. It is also recommended that TTEs should be recruited direct and the present channel of promotion from TCRs should be altogether delinked.

6.3. Punishments under the Indian Railways Act for such offences are not deterrent enough, and we have made specific recommendations in this regard.

6.4. The Senior Divisional Commercial Superintendents should be given a sum of at least Rs. 3,000/- to be used for granting awards to persons giving information, which leads to the apprehension of culprits. This should not be subjected to audit/accounts checks.

6.5. Air brake system should be increasingly introduced in vulnerable areas, which would only cause an audio-visual indication to the driver, who alone will have the power to stop the train. An automatic recorder should be provided for subsequent scrutiny.

6.6. The institution of railway magistracy will have to be considerably strengthened to keep pace with the effort. The cost should be shared by the State and the Railways. The practice of employing retired officers as Railway Magistrates should be given up. The Railway Magistrates should be vested with judicial-cum-executive powers.

6.7. The Railways will have to be more responsive to consumer needs and provide for adequate services to discourage people from resorting to alarm chain pulling. It will have to also take action to provide for incentive to the ticket checking staff for better performance and ease the serious queuing problems taking place for tickets.

6.8. The specific recommendations made regarding blanking off alarm chain apparatus in vulnerable trains and on vulnerable sections in this chapter as also in Part II, Chapter IV should be implemented forthwith.

6.9. An expert group should be appointed to find a way, which would make disconnection of hose-pipes a highly difficult proposition without interfering with Railway's own operations.



## CHAPTER IV

### THEFTS, PILFERAGES, ARSON AND DACOITIES

#### 1.0. Introduction.

1.1. There is widespread deterioration in the law and order situation for the travelling public. Travelling by rail has come to be considered unsafe on many sections and the criticism about this is nearly universal. The matter has received Parliament's attention on many occasions. Alongwith unpunctual running, lack of security is one of the factors responsible for poor public image of the Railways, even though the Railways have little real control on the security of the passengers.

1.2. The deterioration has been discussed in Chapter I, alongwith statistics indicating significant increase in robberies, dacoities, murders and running train thefts. A graphical representation of this incidence is indicated in the charts (pages 339 & 340).

1.3. There is a general feeling that the reporting of these crimes, particularly about running train thefts involving passengers, suffers from serious distortion and inadequacy. The complaints are frequently not made by the travelling public, who are unwilling to take the risk of missing the train. Even if the passengers get down en route, the likelihood of not getting a reservation by subsequent trains compels them to prefer to continue with their journey rather than lodge a report at the appropriate place. There are also no satisfactory arrangements for reporting such thefts during the course of the journey. Statistics are based on F.I.Rs, and F.I.Rs as explained are often not lodged.

1.4. Even with the distortions inherent in the statistical compilation, the increase in the incidence of crime on the Railways is quite alarming. While crime has increased by 75 per cent in the States, it has gone up by 125 per cent in the case of the Railways. It may be clarified that the statistics on crime even in the States are not based on adequate registration of cases, but the proportion of cases not registered in the Railways is larger. The real crime picture on the Railways, therefore, is gloomier than depicted.

1.5. Another aspect of crimes on the Railways is in relation to property, their own as also entrusted to them for transport. The primary responsibility for the protection of such property is with the R.P.F. There is, however, an over-run of responsibility for this with the G.R.P.

#### 2.0. Crimes pertaining to passengers.

2.1. The first aspect to be tackled is the question of registration of crimes. The best solution appears to us to give the travelling public adequate and easy means of accessibility for reporting an occurrence on trains, particularly on running trains. It is futile to expect that the passenger, who gets reservation with difficulty, can get down to lodge a FIR at the place of occurrence, or at the first station after he notices it and who knows

that he is not likely to get a long distance reservation for days. The trains stop for only a few minutes or so and it has been recommended in Part II of our Report that even such halts should be curtailed for long distance trains after ensuring that adequate passenger information system has been set up. GRP thanas are located either outside the station buildings or at the corner of the main platforms. As all trains do not use the main platform, to expect that within the period of stoppage of the train the passenger can go to the thana, lodge a report and come back in time is unrealistic. This can be done, however, if the passenger first approaches the Guard to detain the train and then goes to the thana, lodges the FIR and quickly comes back. This process will take at least half an hour and the GRP may thereupon detain the train further for some on the spot investigation. This also is not at all practical, and it is, therefore, little wonder that for one FIR that is lodged there are a number that are not.

2.2. We have been informed that the Government have already issued instructions on locating the GRP station in a more central manner instead of its continuing in one corner as at present. Suggestions have also been made in various forums about establishment of Police booths on every platform so that the passenger could approach these booths and lodge FIRs etc. Except that the GRP station should be located in as prominent a place as practicable on the main platform, nothing more appears feasible. Therefore, some other solution has to be found.

2.3. A workable solution might be to provide a mobile outpost in the running train, to begin with in every mail and express train. For this purpose, the design of the SLR can be changed and the present accommodation provided for passengers can be reduced to provide a small but independent compartment for setting up a mobile post. This should permit accommodation for the GRP personnel and should have bathroom and other facilities including space for fixing a wireless set.\* The SLRs should be vestibuled. This would imply that the total accommodation for travelling public would be reduced. But we feel that this is not a high price to pay to make checks on thefts, robberies and violence more effective. Such a system will have the following advantages :

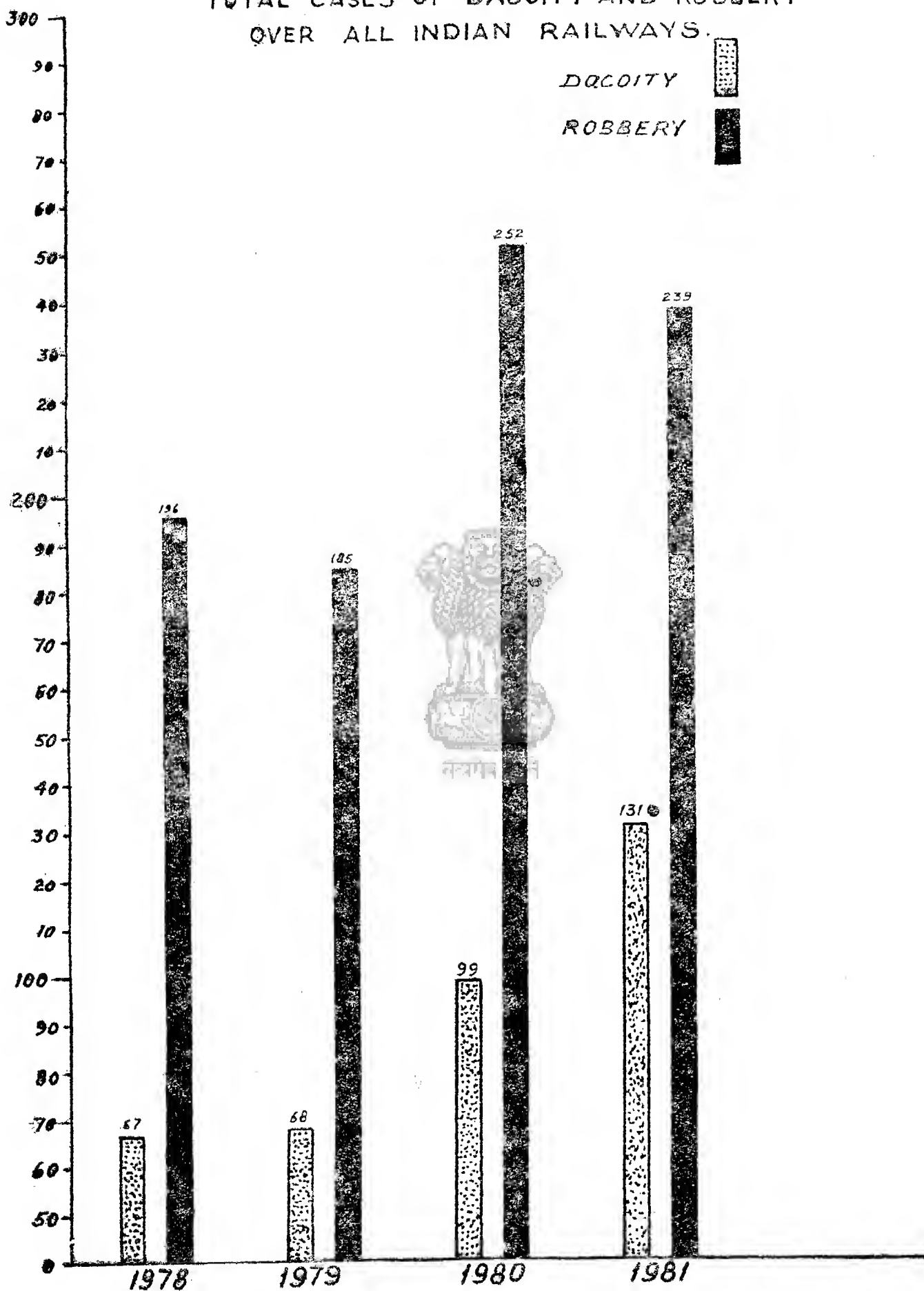
1. It would also cover escorting of trains.
2. The problems of accommodation being raised by the Police for escorts will get solved as they will not have to search for seats.
3. Nearness to Guard may be of additional assistance in cases of alarm chain pulling.
4. As the trains would be fully vestibuled, patrolling even during the run, would be effective.
5. A person could go either through the vestibule or during the halt and lodge a FIR easily.

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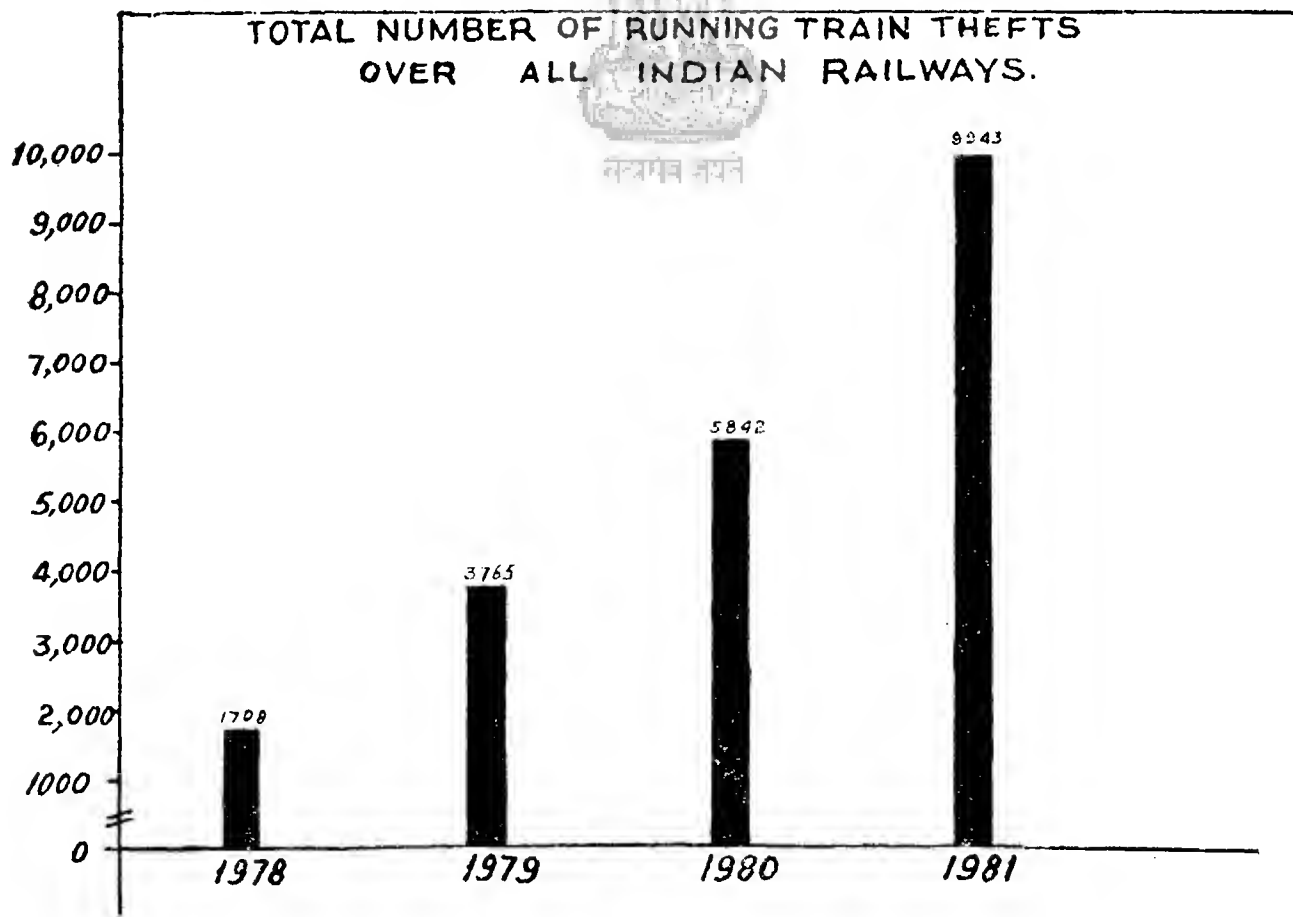
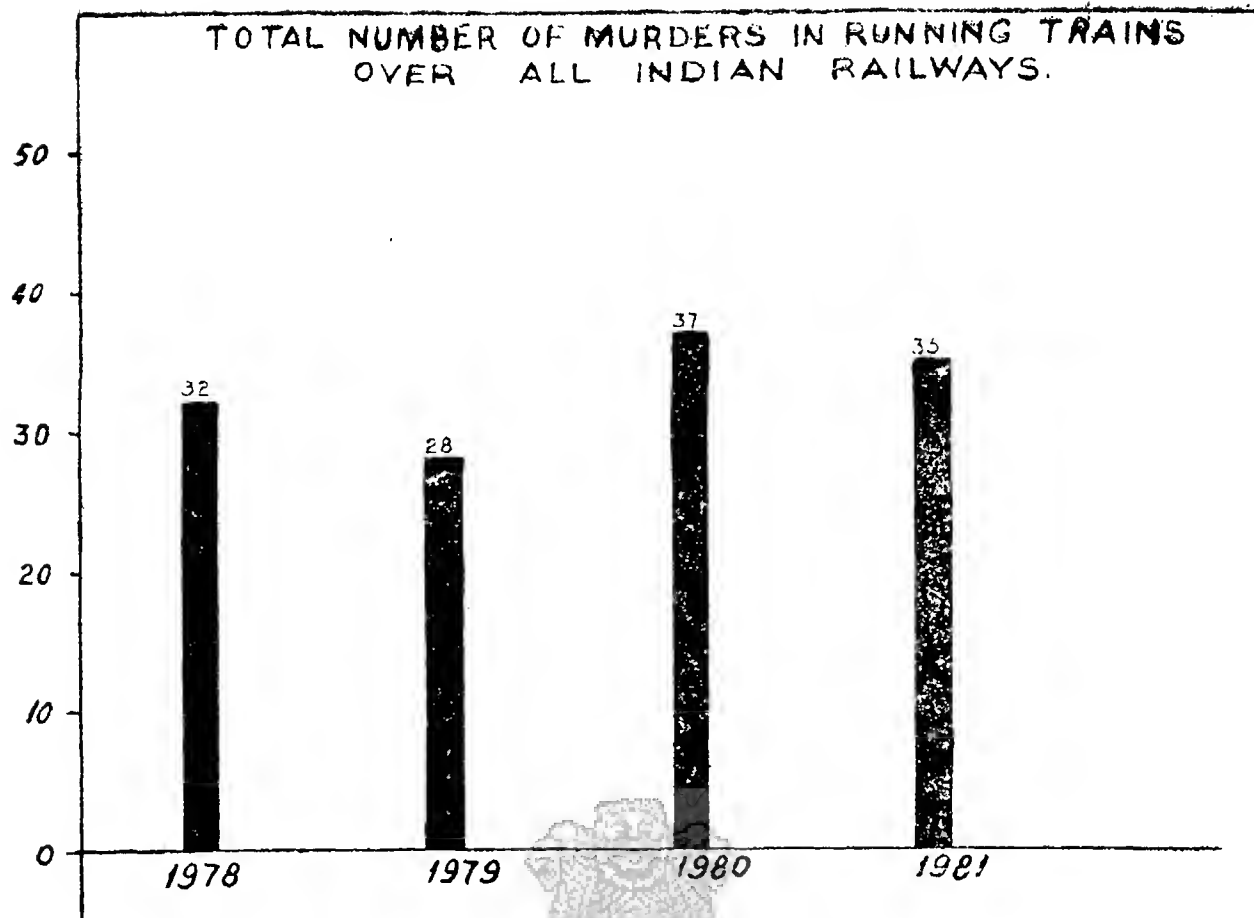
\* Communication between guard and driver and the mobile post will also have to be provided.



TOTAL CASES OF DACOITY AND ROBBERY  
OVER ALL INDIAN RAILWAYS.









2.4. While no half-hearted measure can bring about any lasting improvement, the Committee had also to look into the problem from the considerations of practicability. There are 729 Mail/Express trains running every day in the country on the basis of the latest timetable. The present orders are that all Mail/Express trains in vulnerable areas should be manned during the night time. To begin with, therefore, our recommendation is that the new scheme may be introduced on all Mail and Express trains in vulnerable areas running during the night time. This itself will have a salutary effect on the crime situation if properly enforced, and thereafter its extension to certain vulnerable sections also during the day should be considered in the second phase. The sectional passenger trains will in the first instance be covered by stationary GRP posts, and information can also be flashed through the mobile posts in the Mail/Express trains if they happen to be covered in the particular area by the new scheme.

2.5. The difficulty likely to be encountered in such a system would be in relation to the place of occurrence of a crime and identification of the police post under which the crime has been committed. Presently, the non-registration is also on account of wranglings over jurisdiction. While these matters would be discussed in a later chapter on the constitution of the GRP, RPF the difficulty can be got over by providing that irrespective of the place of occurrence, the mobile post could register the FIR.

2.6. Interestingly, the Committee have been informed by knowledgeable sources that the GRP staff themselves discourage registration of cases presumably because their efficiency is judged by the number of crimes registered in a year. There is, therefore, a conscious attempt to reduce the number of FIRs lodged. Even Members of Parliament have referred to this aspect and have in some cases themselves been prevented from lodging FIRs. Dr. Shantiji Patel from Maharashtra referred\* to the case in which two suitcases were stolen from a second class sleeper coach but the Policemen at Vadodara did not register the FIR.

2.7. Again in an incident, which occurred on Tinsukia Mail on 9 October 1982, two MPs had a similar experience at Kanpur. It will, therefore, be desirable to delink the registration of FIRs in a mobile outpost from jurisdictional matters.

2.8. Once the mobile posts have been set up, it should be possible to get over the problem of non-registration and the reluctance of passengers to lodge FIRs. It would also become easy to start immediate investigations and give assistance.

2.9. I.G., G.R.P., U.P., has advised that he has conducted certain experiments recently with the functioning of wireless sets on running trains. These experiments were undertaken on Lucknow-Hardoi, Lucknow-Pratapgarh, Lucknow-Faizabad and Allahabad-Kanpur sections. This has resulted in contact being established with other police posts, though not necessarily the nearest ones. We feel that provision of such mobile wireless equipment is absolutely necessary.

2.10. Registration of crime is only the first step. What is more important is that crime has to be prevented and also criminals have to be apprehended and their

punishment under the law ensured. As far as the investigation is concerned, wireless sets in the mobile posts would facilitate it. There is a legal difficulty involving jurisdictions. The jurisdictions are limited to a State and in the case of a GRP post, it is limited to a well-defined area. However, as the trains, particularly the fast inter-city trains, travel at high speeds, this may result in the staff of one State being called upon to investigate offences relating to another State. It should, however, not give any unsurmountable problem to arrange immediate investigations and to transfer the FIR later to the appropriate 'thana' or place.

2.11. The Committee would, therefore, recommend the following in respect of registration on mobile posts :

1. It would be obligatory for a GRP mobile post to register a FIR, whenever it is lodged and to conduct immediate investigations etc. irrespective of jurisdiction.
2. Once the jurisdiction is determined, the case will be transferred to the appropriate police station.

### 3.0. Escorting of trains.

3.1. Under the existing arrangements, escorting is being done by the Railway Protection Force even though they are not equipped with powers under the law, equipment or training to deal with law and order problems, specially, those arising out of security of passengers and their belongings. These escorts are being deployed because this is the only force under the control of the Railways.†

3.2. Escorting has to be done by the civil police namely the GRP. After the establishment of mobile posts in running trains this will be achieved, to begin with on the mail and express trains. However, this will require a scrutiny of the manpower requirements of the GRP, a force which has seen a stunted growth during the last ten years. We firmly believe that the organisation and strength as they exist today are not in a position to, provide the required escorts. Further investigations, albeit preliminary, will have to be done immediately, the level of officer in charge of the party to accompany these trains would have to be a Sub-Inspector or an Asst. Sub-Inspector. We recommend that the States and the Ministry of Home Affairs should decide the manpower requirements and arrange the deployment to permit regular escorting adequately, in phases as recommended by us. At the same time we recommend that all future production of SLRs should be of a suitable design with provision for the establishment of a mobile post of GRP in a small compartment of the SLR in the passenger portion. To begin with, we may earmark some space for the mobile post in the existing SLRs in the train.

3.3. Deployment of RPF for escorting is due to inadequacy of GRP strength. This is not a recent feature, as it has continued for the last several years and also finds a mention in the Kripal Singh Committee Report. The Kripal Singh Committee undertook a study of the size of the force employed for unscheduled duties, which included the escorting of passenger trains, and found that about 4,250 RPF staff were being used on such duties every day, over all the Railways.‡

\* Parliamentary debates of Rajya Sabha, Volume CXXI No. 10-82.

† In normal conditions we do not recommend its continuance. We also do not see any advantage except that of creating a

psychological impact and to that extent restoration of confidence in the travelling public.

‡ Para 11.12, page 72, Report of the Expert Committee on Railway Security and Protection.



3.4. This number has gone up as per the recent estimates indicated by the Railway Board. We have been informed that 2,000 RPF personnel are being provided every day, only for escorting trains. While the break-up of the figure of 4,250 meant for escorting duties has not been separately mentioned by the Kripal Singh Committee, the fact remains that a stage has been reached when the resources of the KPF have been too far extended to provide cover for these activities alone. Further escorting does not appear possible without neglect of its legitimate work.

3.5. We recommend that RPF should under normal conditions be absolved of these duties which should clearly devolve on the GRP, whose rightful responsibility it is. States will have to fully take over this responsibility. Another issue impinging on the escorting duties is the fact that escorts are being provided generally for night trains. This concept has also to be given up in the second phase especially for the vulnerable areas as more and more inter-city long distance trains are run. Crime particularly in the vulnerable areas is not confined to nightfall and, therefore, escorting would have to be made a regular feature on all trains in such areas, on the basis of the phasing recommended by us.

3.6. As it would not be possible to organise this immediately this should be implemented in stages under the general pattern recommended by us according to the time table suggested below :—

1. All Mail and Express trains in vulnerable areas\* running during the night time from 1800 hours to 0600 hours.
2. After meeting (.1) above, all Mail and Express trains in certain vulnerable areas running during day time also.
3. After meeting (.2), the remaining passenger trains should be covered.

#### 4.0. Crime against property.

4.1. We have so far discussed the crimes pertaining to passengers, where the present position is far from

satisfactory. The position in respect of property owned by the Railways and property entrusted to them for transport as carriers is, if anything, more unsatisfactory. The Railways have been paying sizeable claims for compensation to the users for loss of "complete packages/consignments" and other pilferages. The details are given in Annexure A. 4.1. In 1958-59, the Railways paid Rs. 2.04 crores as compensation claims; this has gone upto Rs. 13.11 crores in 1981-82. In other words the increase is to more than six times against a freight increase to less than two times.

4.2. In addition to the claims paid by the Railways, the Railways' own property is being subjected to vandalism. Three sets of figures on thefts are being maintained; one set by the RPF; another by the User Department (Commercial Department of the Railway) and yet another by the Accounts Department based on the write-offs to be included in the Appropriation Account. As it happens these sets of figures do not bear any comparison as shown in Annexure A.4.2. Though there are instructions issued by the Railway Board that loss statements submitted by Security, the User Department and Accounts should be reconciled, these instructions have not been implemented. They are also not easy to implement as there is no coordination between the departments in this matter, and it is reasonable to presume that the figures of the Security Department cannot be correct, as they are the department whose image is likely to become tarnished as the figures increase.

4.3. We consider that such reconciliation is unnecessary and leads to wastage of time and effort. The information compiled by the user Department portrays the 'facts of life' and should be adopted as the official statistics. No reconciliation need be attempted.

4.4. The figures maintained by the Security Department on the value of property stolen, recovered, arrests made of outsiders, railway employees and RPF personnel are shown in a statement given as Annexure A.4.3. Table No. 4.1 summarises the position in respect of booked consignments. It will be seen that over the years only the percentage recovery of stolen consignments has gone down.

Table 4.1  
Statement of crime against booked consignments

Year	No. of cases	Value of property (in thousands)		%age recovery	Arrests made			
		Stolen (Rs.)	Recovered (Rs.)		Outsiders	Rly. Emp.	RPF	Total
1978	40,926	18,416.2	2,083.4	11.31	4,026	333	71	4,430
1979	50,111	33,913.5	2,671.7	7.87	4,167	319	73	4,559
1980	59,215	48,535.1	4,529.1	9.33	5,160	389	92	5,641
1981	63,455	67,116.3	4,467.9	6.65	5,225	452	118	5,773
1982 (Upto Nov. only)	56,365	67,671.3	6,361.9	9.40	4,715	461	72	5,248
%age increase/decrease in 1981 over 1978.	(+) 55.1	(+)264.4	(+)114.4	..	(+) 29.8	(+) 35.7	(+) 66.2	(+)30.3

The position in respect of thefts is also shown for a ready comparison by means of charts at pages. These charts cover.

1. Total number of cases against railway materials and booked consignments.

2. Total value of property stolen of railway materials and booked consignments.

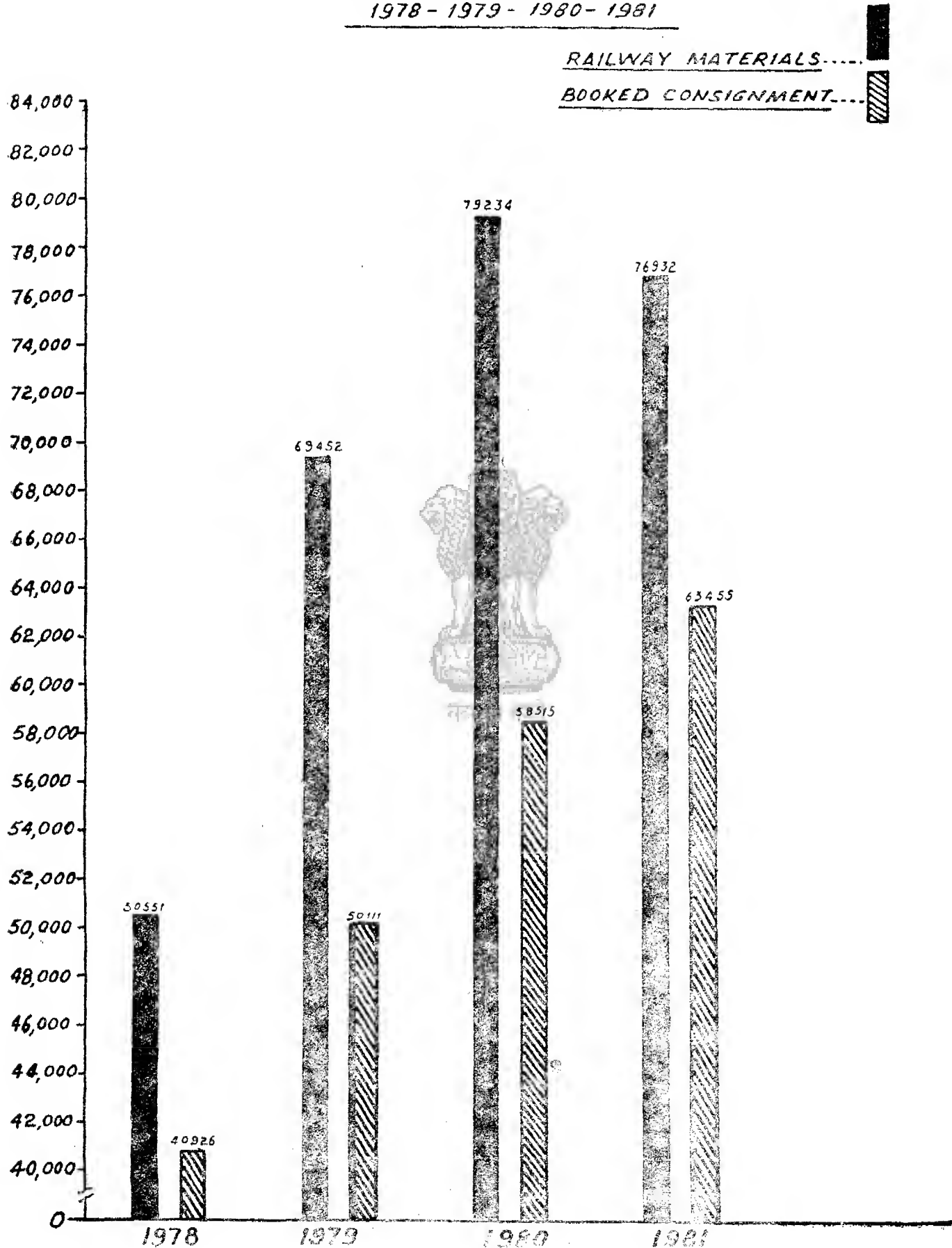
3. Number of cases of arrests made against booked consignments broken up separately for outsiders, railway employees and RPF employees.

\* Vulnerable areas would be areas of the North and North East.



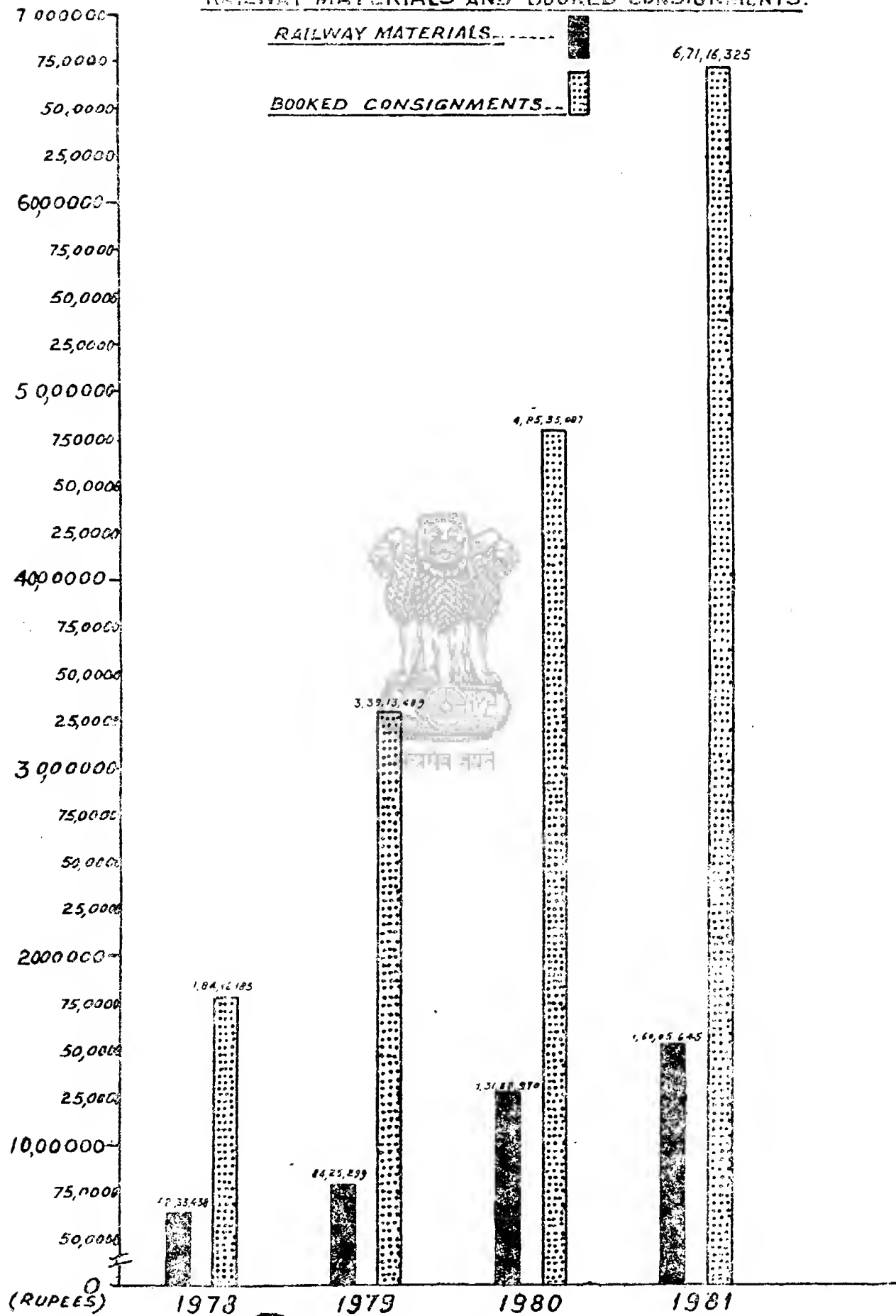
## THEFTS ON INDIAN RAILWAYS

TOTAL NUMBER OF CASES AGAINST RAILWAY MATERIALS  
AND BOOKED CONSIGNMENT FOR THE YEAR  
1978 - 1979 - 1980 - 1981



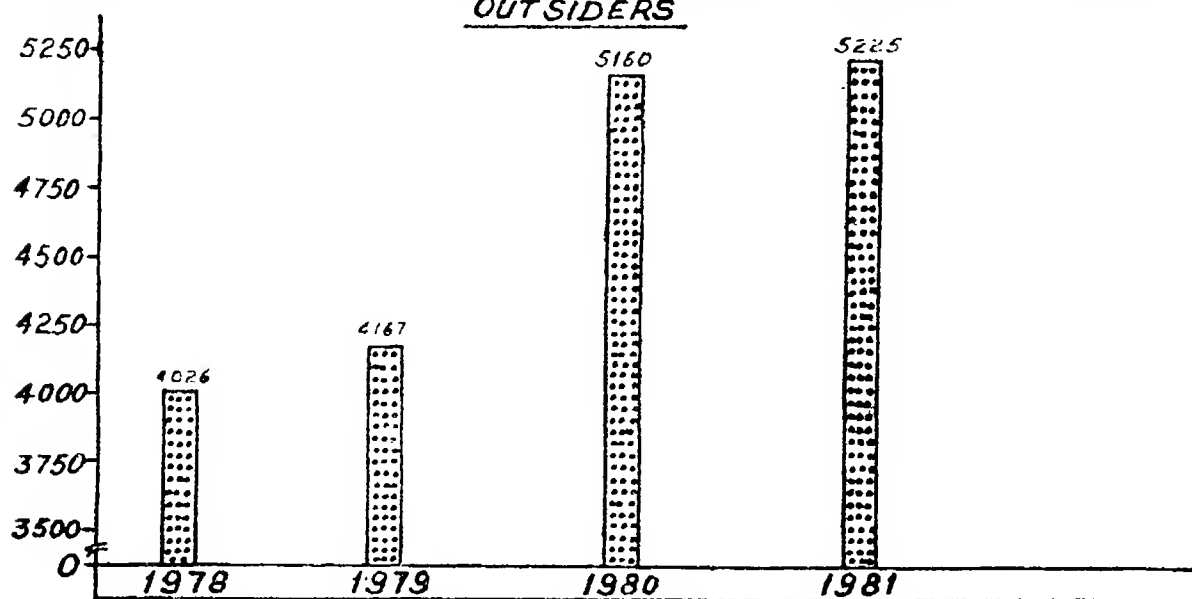


**TOTAL VALUE OF PROPERTY STOLEN OF  
RAILWAY MATERIALS AND BOOKED CONSIGNMENTS.**

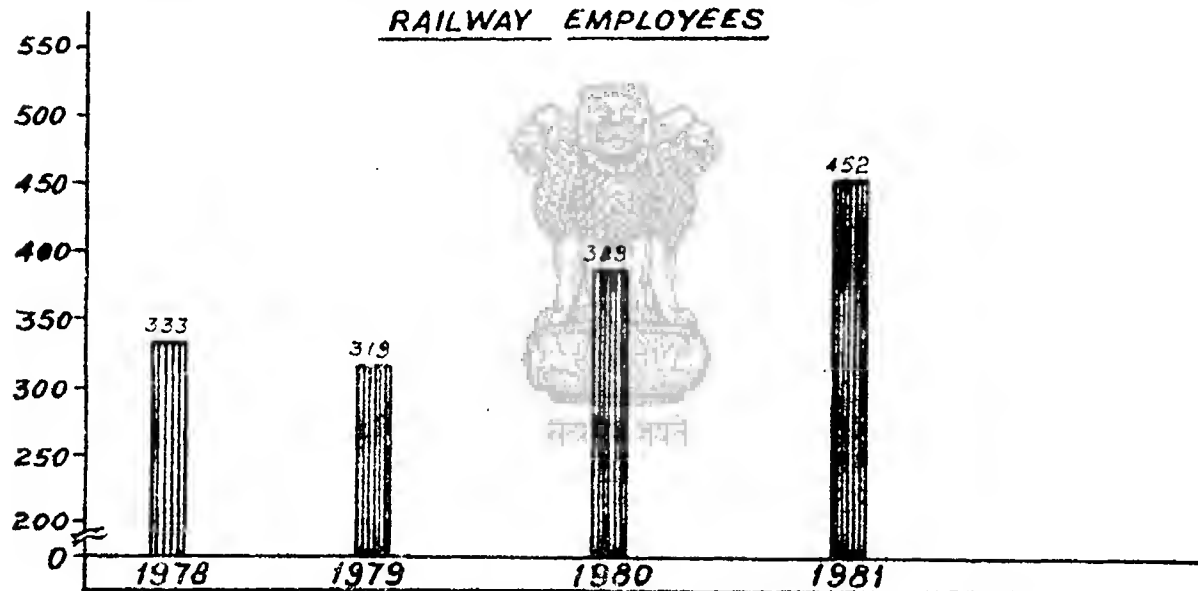




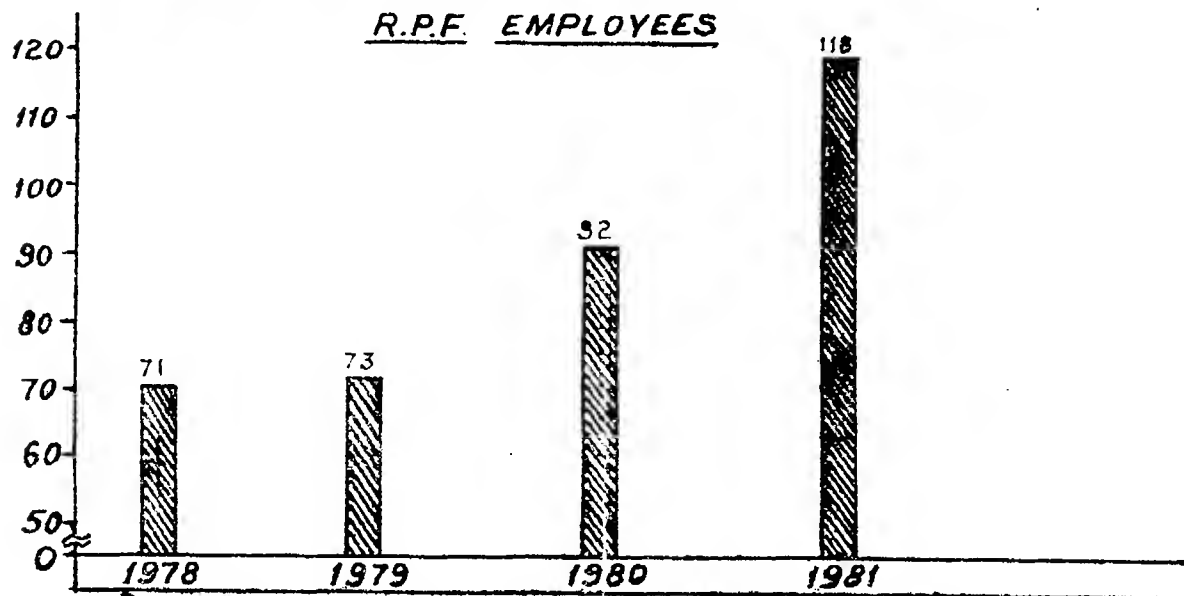
NUMBER OF CASES OF ARRESTS MADE AGAINST BOOKED CONSIGNMENT  
OUTSIDERS



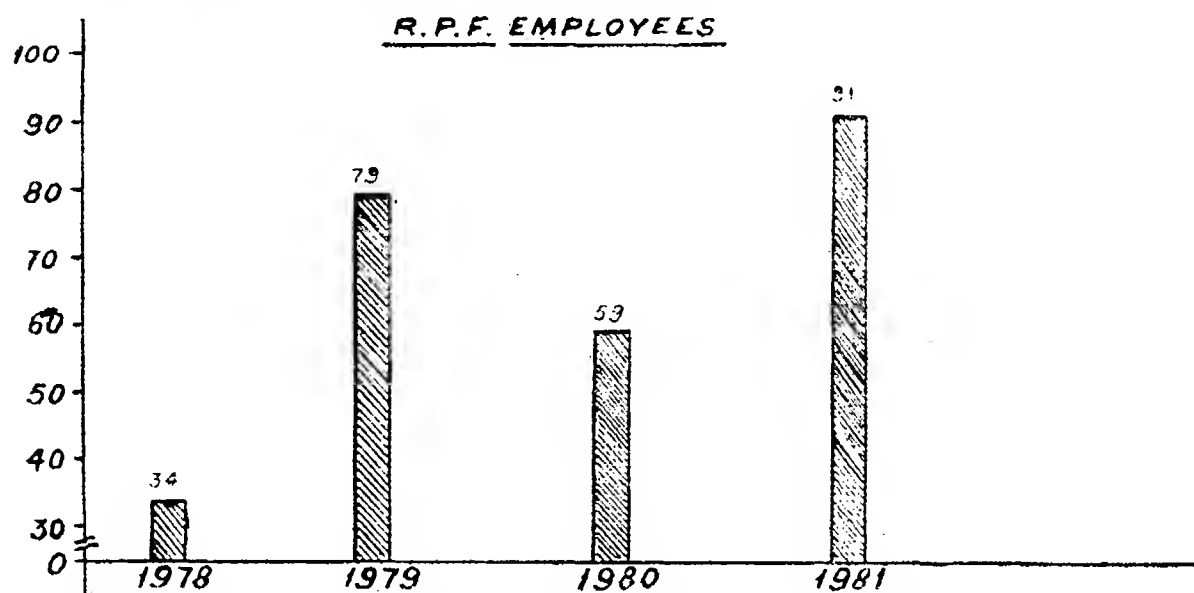
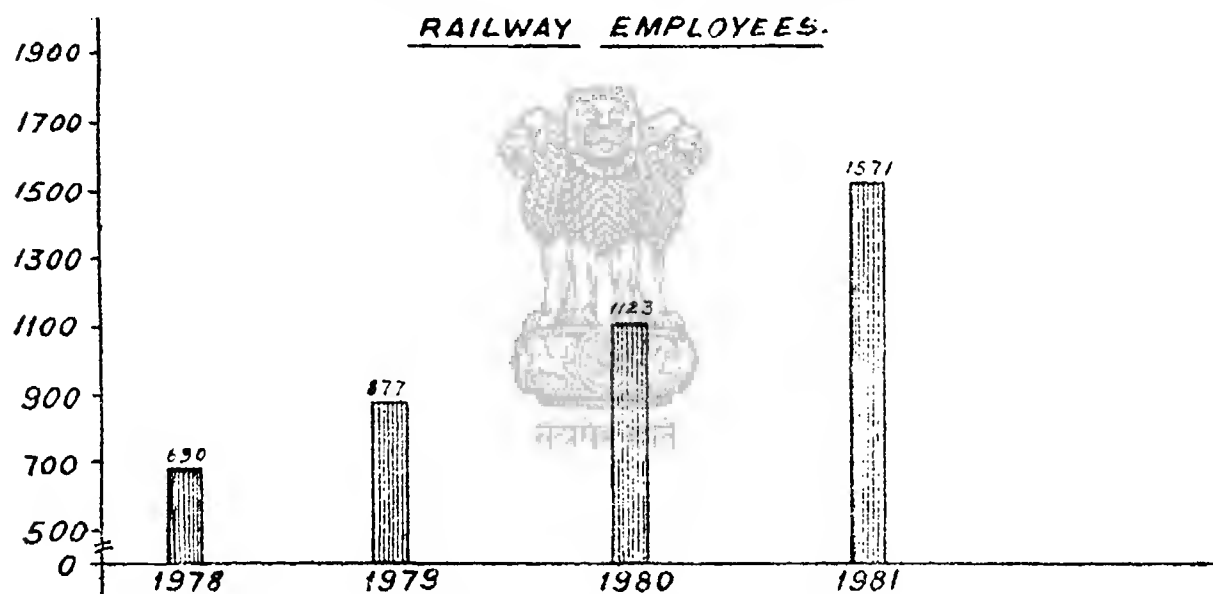
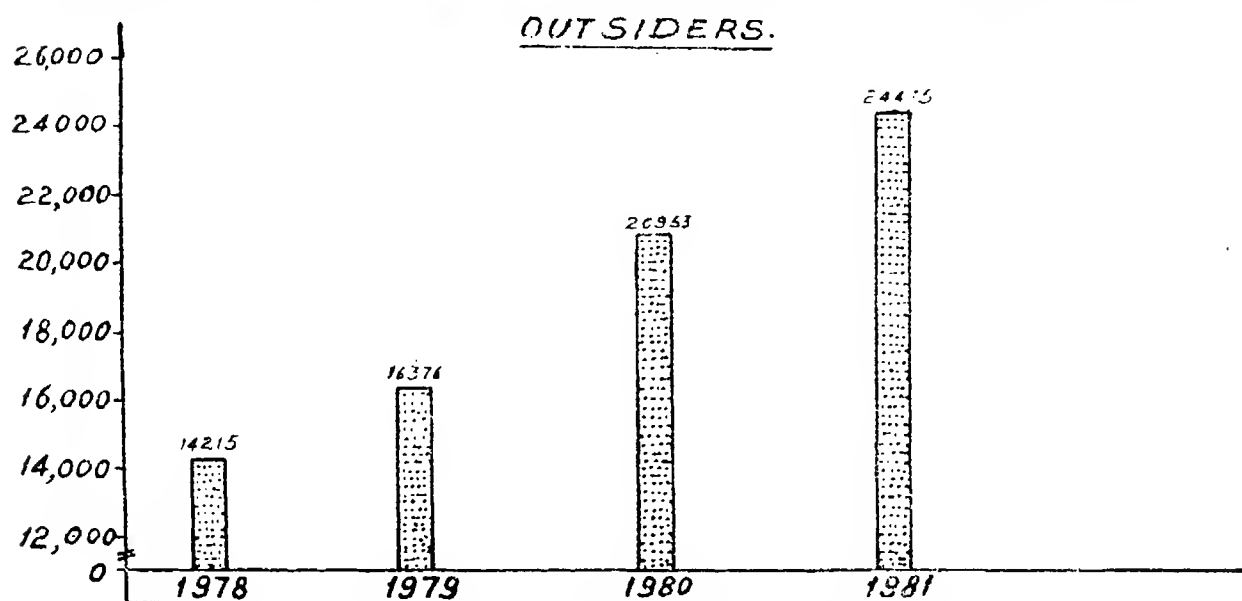
RAILWAY EMPLOYEES



R.P.F. EMPLOYEES





NUMBER OF CASES OF ARRESTS MADE AGAINST RAILWAY MATERIALS:



4. Number of cases against railway materials again broken up category-wise.

4.3.1. These charts lead to the following conclusions:

1. The total number of thefts for booked consignments has been increasing rapidly during the last 4 years. The rise is continuous.
2. As far as the railway materials are concerned, there is a slight fall in 1981 as compared to 1980, otherwise there is a continuous and substantial increase.
3. In respect of value of property stolen, both of railway materials and booked consignments, there is a continuous and rapid increase for the latter category. There is a continuous increase for Railway materials but not as steep.
4. For booked consignments the arrests have been going up for all categories during the period of 4 years i.e. for outsiders the arrests have gone up by 30 percent, for Railway employees by 36 per cent and for the RPF by 66 percent. The deterioration in the RPF appears to be much higher.
5. Similarly in the number of cases in which arrests have been made against railway material thefts, the arrests have gone up in all the three categories, namely outsiders, railway employees, and the RPF employees, the respective percentages being 74 percent, 128 percent and 168 percent. Here again the largest deterioration indicated is in respect of the RPF.

4.4. The involvement of railway employees and RPF staff has been studied in relation to the total number of staff because absolute numbers can be misleading: while doing so the number of railway employees in all the departments has been taken. This is shown in Table 4.2. A graph is also attached. These show that the graph of increasing arrests of RPF employees (except for 1979-80) has been steeper than of the railway employees. This leads to the conclusion that the RPF staff themselves are involved in a significant degree and their involvement is getting more and more pronounced. The other railway employees are also involved but constitute a smaller percentage. We feel that this is a dangerous trend in as much as the very persons entrusted with the responsibility of

protection of railway property are featuring in arrests pertaining to crimes against Railway property. This can be tackled only by meting out deterrent punishments.

Table 4.2

Statement showing comparative involvement of other Railway Employees and RPF staff.

	1978	1979	1980	1981
1. Total No. of Class III and Class IV employees of all Departments.*	14,25,096	14,54,055	14,78,416	14,99,139
2. Total No. of Railway employees arrested.*	1023	1196	1512	2023
3. Percentage of employees arrested to total employees.*	0.071	0.082	0.102	0.134
4. Total No. of RPF employees.	60,256	60,995	61,493	61,852
5. Total No. of RPF employees arrested.	105	152	151	209
6. Percentage of RPF employees arrested to total RPF employees.	0.174	0.249	0.245	0.337

4.5. A mention has already been made in earlier paragraphs that the number of cases and the value of property stolen has been going up. From Table 4.1 it would be observed that the percentage of recovery has gone down in 1981 as compared to 1978. During the same period crime has increased by 264 percent.

4.5.1. The picture is more or less the same in respect of thefts of railway materials. Detailed figures railway-wise are furnished in Annexure A.4.4. A summary is given table 4.3.

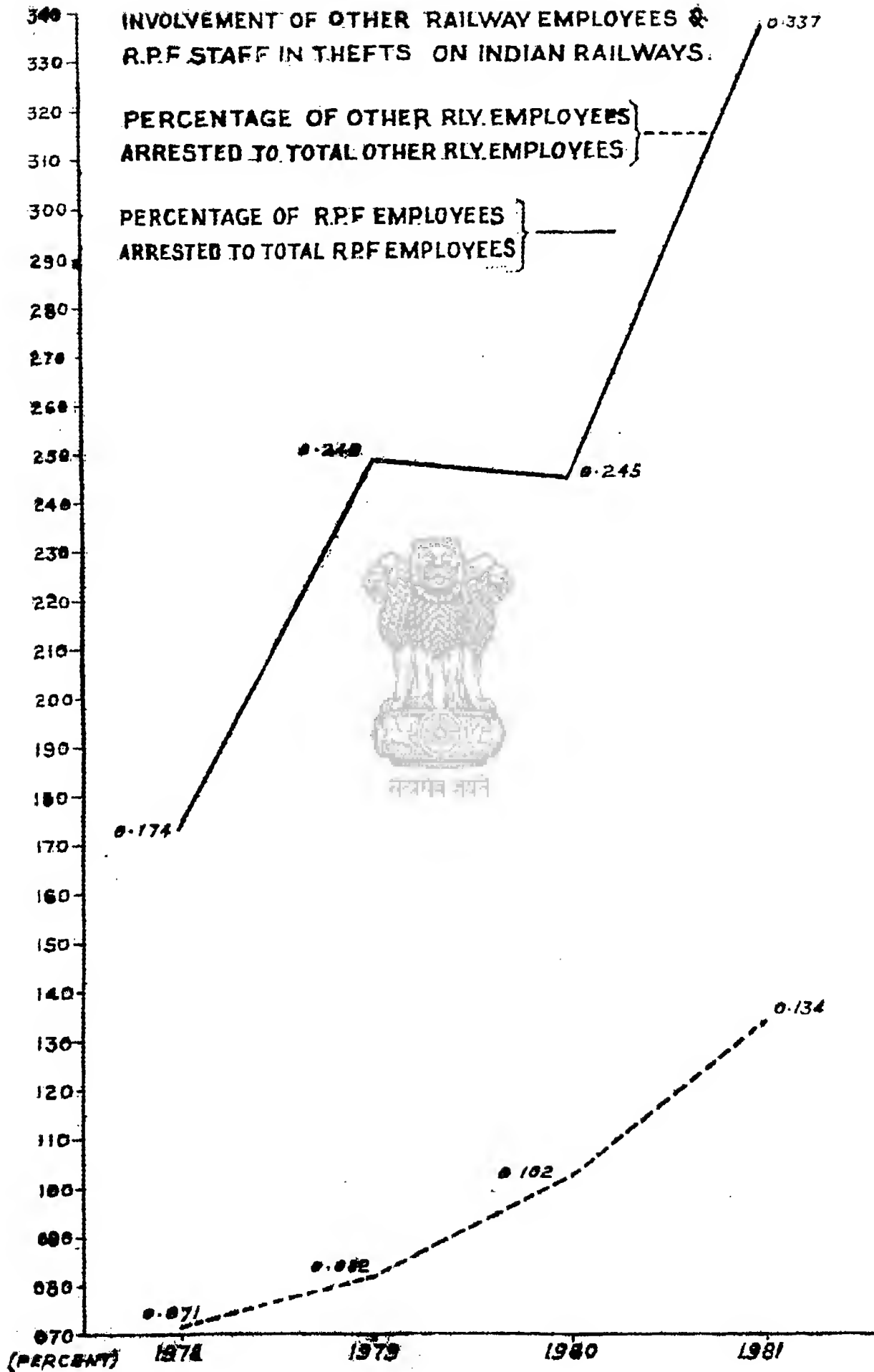
4.6. Statistics as regards the payment of compensation claims due to thefts are not reliable as these are based on the fact that the RPF themselves have reported the occurrence of thefts etc. Claims may be paid but in case such reports of thefts have not all been made by the RPF, those not reported do not figure in the statistics. We, therefore, are not sure of these statistics. The incidence of thefts in our view is significantly higher than what is being reported.

Table 4.3  
Statement of crime against railway material.

Year	No. of cases	Value of property (in thousands)		%age recovery	Arrests made			
		Stolen (Rs.)	Recovery (Rs.)		Out-siders	Rly. Emp.	RPF	Total
1978	56,551	6,233.3	2,002.4	32.1	14,215	690	34	14,939
1979	69,452	8,425.3	3,133.5	37.2	16,376	877	79	17,332
1980	79,284	13,188.3	4,749.1	36.0	21,853	1,123	59	23,035
1981	76,929	16,005.7	8,080.4	50.50	24,675	1,571	91	26,337
1982 (Upto Nov. only)	72,860	13,920.6	8,120.0	58.33	20,691	1,560	36	22,287
%age increase in 1981 over 1978	52.2	156.8	303.5	57.3	73.6	127.7	167.6	76.3

\* Does not include RPF.







4.7. The Commercial Officers should be enjoined to inform the RPF of cases where they feel prima-facie evidence points to a theft. The RPF should then get these cases registered and include them in their statistics and take further necessary action.

4.8. A vital aspect of claims is its prevention. Claims Prevention Cell exists on all the Railways and these have been specifically created for the purpose of reducing incidence of thefts etc. These Cells appear to be structurally weak as they do not have any interaction with RPF personnel. The RPF officers must be attached to these Cells so that problems can be tackled more effectively. An analogy can be drawn from the Safety Organisation where the safety officer has officials of all the departments working with him for undertaking proper checks. As RPF has an immediate interface their staff must also be inducted and placed in the Commercial department to man these cells.

4.9. Another area in which these Cells have to enlarge their activities is commercial intelligence in respect of claims. Based on their information arising out of repetitive payments they should have a machinery to study the reasons for the claims specially in particular stations or a particular area and for this also the RPF officers have to be associated because they alone can undertake action to eliminate organised gangs.

4.10. Another area is the fixation of responsibility for claims. We consider that the fixation of responsibility both in the case of commercial staff and the RPF leaves much to be desired. It is understood that while there is some system in the Commercial side and the staff is taken up for action, though after prolonged delays, but finally punishment meted out is mild and ineffective. This cannot be said about the RPF staff where responsibility is hardly ever fixed. Random analysis made indicates that on the Commercial side the system has not functioned because by the time the claims get settled, considerable time elapses and the delay destroys the urgency of punishment. It is also seen that the responsibility has to be fixed by the field staff on the reports made by the Commercial Claims Officers and the field officers do not take as strong a view as is required to be taken. A solution would be that the staff responsibility should also be fixed by the Commercial Claims officers and only appeals should lie to the DRM of the Division, in which the staff is functioning. Implementation of such a step would require transferring of staff to the Claims Officers for this purpose. Penalties in both cases should be deterrent but as regards RPF, the penalties for cases of omission and commission should be far more deterrent than the other staff because they are entrusted with the task of protection. Minimum punishment where moral turpitude is involved should be dismissal.

4.11. Another change which should be made is that the RPF should be made jointly responsible with commercial staff in case of missing packages from seal-intact wagons. When shortages occur from seal-intact wagons the presumption is that there is a mix-up at the loading stage. There is a strong presumption that shortage exists even at the time of loading. The RPF is supposed to protect packages on the platform during the process of loading. It is, therefore, felt that they should also be held responsible alongwith the Commercial Staff for any shortage which can happen either with the connivance of both or due to mischief of either of the parties. Today when the wagons arrive with seals intact the entire brunt of shortage is passed on to the Commercial Clerk. Joint responsibility has been

suggested because it impinges on the protection of property.

## 5.0. Conclusions.

5.1. The crimes against the travelling public as reflected by the number of robberies, dacoities murders and running train thefts have increased substantially over the years. Even these statistics do not indicate the real story, as the reporting of such crimes is not satisfactory. Besides, non-registration of cases is very large and excessive. The real crime picture on the Railways, therefore, is gloomier than depicted.

5.2. The present system of registration of crimes and lodging of FIRs is both inadequate and inconsistent. We recommend establishment of GRP outposts on all passenger-carrying trains. These posts in the first phase, can be established in all Mail/Express trains running in the vulnerable areas of North Eastern, Eastern, Central and South Eastern Railways in the states of Bihar, Uttar Pradesh, Madhya Pradesh and West Bengal. Again, in the first phase, these outposts can be operated during night from 1800 hours to 0600 hours. In areas considered acutely vulnerable, the outposts may also be manned during daytime and cover selected passenger trains.

5.3. Such GRP outposts should be provided in the SLR. The design of the SLR should be changed and the existing passenger compartment be partitioned to create the required space for the post. The compartment for the GRP post should be able to accommodate a few GRP personnel and a wireless set. In the new construction of SLRs, the design should be changed to provide these facilities. In the meantime, space should be provided in the existing SLRs for such posts.

5.4. It should be made mandatory for the mobile posts to register the FIRs, irrespective of jurisdiction and to take further necessary investigative action.

5.5. Escorting of passenger trains is being done by the RPF though it is the responsibility of the GRP. This has had adverse consequences on the functioning of the GRP and RPF. We recommend that the RPF should be absolved of such duties in a phased manner.

5.6. The position of crimes in respect of railway property and property entrusted to it for carriage is unsatisfactory. Consequently, the Railways have been paying sizeable claims.

5.7. The Railway's own property is being vandalised in a big manner and correct figures are not available. Official statistics in this respect should be based on the estimates of the users department.

5.8. Thefts of booked consignments have been increasing rapidly and continuously. The arrests for such thefts have also been going up, but for RPF employees percentage-wise the increase is in comparison much higher. This leads to a conclusion that RPF staff themselves are involved in a big manner, which is a dangerous trend. This has to be tackled by meting out deterrent punishments.

5.9. The theft of railway property has to be tackled by re-organisation of RPF and GRP forces, which has been discussed separately.

5.10. Statistics as regards the payment of compensation claims due to thefts do not reflect the actual incidence of thefts as many cases remain unreported by



**RPF.** Registration of cases at the instance of commercial officers must be initiated by RPF, where prima-facie evidence points to a theft.

5.11. RPF officers must be inducted into 'Claims Prevention Cells' so that not only the problem of reducing incidence of thefts can be tackled more effectively but also the menace of repetitive payment of claims.

5.12. In the case of missing packages from sealed intact wagons RPF staff should be made jointly responsible alongwith the Commercial Staff. The punishments in both cases should be deterrent but in the case of involvement of RPF staff should be more deterrent.

*Annexure A.4.1  
(Cf. para 4.1)*

**Statement showing number of claims and the amount of compensation paid on Indian Railways during 1972-73 to 1981-82 in respect of loss of packages/consignments and pilferage.**

Railway	1972-73		1973-74		1974-75		1975-76		1976-77	
	Number	Amount	Number	Amount	Number	Amount	Number	Amount	Number	Amount
Central	931,99	76.08	34,782	97.50	34,185	114.78	23,870	99.87	14,477	67.81
Eastern	39,187	221.54	37,260	192.75	36,479	260.07	46,510	300.31	30,565	250.14
Northern	40,001	137.75	31,803	112.76	41,149	129.35	35,027	128.30	16,273	119.95
North Eastern	21,496	48.18	18,959	59.90	20,331	60.36	17,905	58.26	10,416	40.36
Northeast Frontier	10,764	90.39	13,205	127.16	13,115	120.69	13,039	122.87	10,755	125.06
Southern	15,629	63.00	15,651	59.13	15,529	71.03	15,903	72.61	7,453	32.44
South Central	12,875	41.05	12,206	46.22	11,792	58.02	9,893	71.14	4,579	46.58
South Eastern	29,009	122.33	19,762	108.26	20,535	114.35	25,260	120.31	19,473	153.31
Western	46,623	113.59	40,988	104.17	43,252	134.45	34,864	158.23	18,146	113.06
<b>Total</b>	<b>2,48,583</b>	<b>912.91</b>	<b>2,24,616</b>	<b>984.21</b>	<b>2,36,367</b>	<b>1063.10</b>	<b>2,22,271</b>	<b>1141.90</b>	<b>1,32,135</b>	<b>968.71</b>

Railway	1977-78		1978-79		1979-80		1980-81		1981-82	
	Number	Amount	Number	Amount	Number	Amount	Number	Amount	Number	Amount
Central	23,178	71.61	18,899	73.22	19,822	74.33	22,553	89.41	20,301	132.49
Eastern	25,760	295.01	22,956	223.58	18,200	169.44	20,186	190.52	29,914	350.83
Northern	17,155	144.03	18,334	105.77	16,881	108.29	21,734*	136.14	23,575	218.35
North Eastern	9,552	30.19	11,595	27.21	13,298	30.84	13,549	41.59	13,430	49.13
Northeast Frontier	8,655	93.86	8,402	51.25	6,548	52.33	8,163	64.27	12,879	120.79
Southern	11,027	37.99	6,198	48.93	7,509	54.17	8,685	62.22	9,167	74.46
South Central	5,638	51.21	4,478	39.95	3,932	27.48	3,739	46.44	3,393	47.21
South Eastern	22,735	173.02	21,429	140.18	18,052	104.28	20,517	141.59	17,587	138.17
Western	18,309	102.97	19,614	93.30	18,706	114.10	18,459	190.64	19,813	229.27
<b>Total</b>	<b>1,31,009</b>	<b>999.89</b>	<b>1,31,905</b>	<b>803.33</b>	<b>1,22,948</b>	<b>732.28</b>	<b>1,37,585</b>	<b>962.82</b>	<b>1,50,605</b>	<b>1,310.70</b>

*Annexure A. 4.2  
(Cf. para 4.2)*

**Loss on account of thefts (booked consignments and railway materials/fittings on Indian Railways during 1977-78, 1978-79, 1979-80, 1980-81 and 1981-82.**

(Figures in lakh of Rs.)

Years	(A)	(B)	(C)
	Amount as shown in write-offs in Appropriation Account of Railways in India	As maintained by the Directorate of Security Railway Board. (These are net figures after counting in recoveries)	As compiled by the Claims Organisation on the claims compensated
1977-78	83.77	159.02	999.89
1978-79	66.78	245.55	803.33
1979-80	103.28	400.76	732.28
1980-81	68.18	571.40	962.82
1981-82	N.A.	689.19	1,310.70



Railway-wise compilation of crime against booked consignment for the year 1978,  
1979, 1980, 1981 and 1982 (upto November)

Railways	Year	No. of cases	Value to Property		Percentage Recovery	Arrest made			Total Arrests
			Stolen (Rs.)	Recovered (Rs)		O/S*	R/E**	RPF	
C. Railway	1978	2,512	15,71,912	2,56,477	16.30	395	32	10	437
	1979	3,581	19,12,695	3,46,085	18.10	486	40	21	547
	1980	3,662	21,65,990	6,06,124	28.00	579	58	20	657
	1981	3,588	35,38,921	5,66,333	16.00	525	45	24	594
	1982	3,089	28,92,554	9,35,455	32.34	445	40	22	507
Eastern Railway	1978	11,633	60,28,546	4,29,935	7.13	546	30	35	611
	1979	12,527	1,24,68,657	9,96,258	7.99	674	26	9	709
	1980	13,740	1,78,64,150	14,30,665	8.00	658	29	9	696
	1981	15,602	2,68,62,803	12,27,625	4.56	787	64	14	865
	1982	16,402	3,12,86,122	15,43,457	4.93	978	21	7	1006
Northern Railway	1978	4,564	18,17,496	5,04,448	27.70	548	71	4	623
	1979	12,216	65,43,838	5,56,236	8.50	604	60	7	671
	1980	5,639	71,41,738	6,54,120	9.15	788	108	25	921
	1981	16,364	85,52,732	6,25,520	7.31	791	85	32	911
	1982	11,932	76,67,548	8,63,019	11.25	548	116	11	675
North Eastern Railway	1978	5,268	18,68,115	69,068	3.69	140	8	...	148
	1979	5,856	34,41,467	85,970	2.49	142	18	2	162
	1980	6,143	41,62,180	2,29,173	5.50	175	16	2	193
	1981	3,800	37,62,913	2,13,885	5.68	116	14	1	131
	1982	4,301	57,72,197	4,45,225	7.71	173	4	...	177
Northeast Frontier Railway	1978	1,351	6,63,962	32,075	4.83	164	13	8	185
	1979	1,581	10,49,725	59,093	5.62	200	20	4	224
	1980	1,609	13,78,401	88,052	6.38	213	13	13	239
	1981	1,349	22,10,108	1,41,059	6.38	333	16	7	356
	1982	1,556	30,63,391	2,34,800	7.66	321	33	13	367
Southern Railway	1978	3,186	7,51,896	1,68,893	22.40	299	42	1	342
	1979	2,459	7,23,338	1,28,399	17.75	295	49	...	344
	1980	925	5,47,911	3,05,158	55.60	346	33	1	370
	1981	4,735	28,95,978	4,41,347	15.23	483	72	6	561
	1982	1,968	9,34,159	4,46,465	47.79	379	84	...	463
South Central Railway	1978	1,525	7,94,028	2,49,043	31.30	668	31	1	700
	1979	1,508	5,53,501	1,34,574	24.30	368	17	11	396
	1980	1,736	10,55,885	2,32,945	22.06	516	38	2	556
	1981	2,375	15,29,197	3,71,093	23.65	611	30	1	642
	1982	2,168	15,36,562	4,42,945	28.82	741	71	2	814
South Eastern Railway	1978	6,500	33,89,185	1,23,728	3.65	472	37	7	516
	1979	7,796	60,44,335	2,10,626	3.48	591	51	13	655
	1980	9,822	1,16,08,238	7,20,112	6.20	1008	61	12	1081
	1981	8,610	1,46,18,221	5,06,206	3.43	760	86	4	850
	1982	9,553	1,21,89,371	11,88,328	9.74	656	53	13	722
Western Railway	1978	4,387	15,31,045	2,49,749	16.30	794	69	5	868
	1979	2,587	11,65,933	1,54,436	13.24	807	38	6	851
	1980	5,939	26,10,094	2,62,709	10.06	877	43	8	928
	1981	7,024	31,45,452	3,74,826	11.91	816	40	7	863
	1982	5,396	23,29,384	2,61,845	11.24	474	39	4	517
Total :	1978	40,926	1,84,16,185	20,83,416	11.31	4,026	333	71	4,430
	1979	50,111	3,39,13,489	26,71,673	7.87	4,167	319	73	4,559
	1980	59,215	4,85,35,087	45,29,058	9.33	5,160	389	92	5,641
	1981	63,455	6,71,16,325	44,67,894	6.65	5,225	452	118	5,773
	1982	56,365	6,76,71,288	63,61,869	9.40	4,715	461	72	5,248

Note.—Figures for 1982 are upto November only.

\* O/S— Outsiders.

\*\* R/E— Railway Employees.



Railway-wise compilation of crime against Railway materials for the year 1978,  
1979, 1980, 1981 and 1982 (upto November)

Railways	Year	No. of cases	Value of Property		Percentage Recovery	Arrest Made			Total Arrest
			Stolen (Rs.)	Recovery (Rs.)		O/S*	R/E**	RPF	
1	2	3	4	5	6	7	8	9	10
Central Railway	1978	2,535	3,76,641	2,67,246	70.95	2,003	110	4	2,117
	1979	5,122	6,95,009	3,69,015	53.09	2,482	116	3	2,601
	1980	6,310	8,82,355	6,25,817	70.92	3,204	149	7	3,360
	1981	6,646	11,49,059	7,03,965	61.25	3,378	215	7	3,600
	1982	5,523	10,12,447	6,33,033	62.52	2,707	185	8	2,900
Eastern Railway	1978	17,563	16,31,844	4,97,885	30.30	1,519	26	5	1,550
	1979	17,418	21,52,426	12,13,979	56.40	1,535	24	2	1,561
	1980	19,140	42,23,237	13,81,156	32.70	2,561	45	8	2,614
	1981	17,827	68,95,091	20,97,608	30.40	3,325	70	7	3,402
	1982	18,247	54,32,406	22,59,368	41.59	2,849	80	4	2,933
Northern Railway	1978	29,299	19,87,216	1,92,511	9.68	2,741	140	7	2,888
	1979	30,244	24,90,223	3,26,789	13.12	2,541	218	4	2,763
	1980	32,547	30,27,461	4,82,410	15.90	3,522	291	8	3,821
	1981	31,331	28,48,730	12,58,623	44.10	4,103	417	8	4,528
	1982	32,240	27,31,216	7,64,586	28.00	3,461	406	8	3,875
Northeast Railway	1978	369	1,65,388	1,20,717	72.90	469	59	6	534
	1979	971	1,56,086	1,85,457	108.80	648	97	13	758
	1980	1,116	2,96,528	2,51,156	84.69	709	97	29	835
	1981	1,299	2,90,069	3,31,145	114.10	934	107	32	1,073
	1982	1,073	6,05,875	9,16,793	151.30	737	108	4	849
Northeast Frontier Railway	1978	290	3,11,374	27,446	8.81	216	19	1	236
	1979	623	3,98,982	89,256	22.37	393	24	1	418
	1980	813	7,36,292	2,43,962	33.19	473	34	...	507
	1981	1,030	8,97,664	6,51,418	72.50	803	72	1	876
	1982	835	6,34,279	4,81,244	75.87	642	44	...	686
Southern Railway	1978	944	2,17,301	2,34,693	108.00	1,089	67	3	1,159
	1979	1,589	2,06,343	2,10,587	102.05	643	56	2	701
	1980	2,460	4,66,658	3,85,305	82.58	1,505	64	3	1,572
	1981	2,613	3,53,373	7,13,051	201.70	2,148	131	1	2,280
	1982	1,995	2,35,666	4,78,515	203.00	1,195	113	1	1,309
South Central Railway	1978	1,359	4,83,770	3,10,118	64.10	1,170	82	1	1,253
	1979	2,267	7,37,294	2,27,021	30.70	1,604	110	20	1,734
	1980	2,142	7,97,834	4,13,231	52.42	1,879	119	3	2,001
	1981	2,754	7,53,289	5,37,700	67.29	2,154	176	4	2,334
	1982	3,839	9,87,291	7,50,640	76.00	3,112	266	4	3,382
South Eastern Railway	1978	3,445	6,99,847	1,28,019	18.29	1,870	56	4	1,930
	1979	5,646	8,66,932	2,44,523	28.20	2,446	101	21	2,568
	1980	7,319	16,23,502	5,74,558	35.39	3,644	164	...	3,808
	1981	6,797	17,77,869	11,72,336	65.09	3,274	200	22	3,496
	1982	5,532	15,25,375	15,08,724	99.00	2,863	191	2	3,056
Western Railway	1978	747	3,60,057	2,23,728	62.13	3,138	131	3	3,272
	1979	5,572	7,22,004	2,66,843	36.95	4,084	131	13	4,228
	1980	6,437	11,35,103	3,91,488	34.46	4,356	160	1	4,517
	1981	6,632	10,40,581	6,14,587	59.39	4,556	183	9	4,748
	1982	3,576	7,56,046	3,27,121	43.26	3,125	167	5	3,297
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Total :	1978	56,551	62,33,438	20,02,363	32.12	14,215	690	34	14,939
	1979	69,452	84,25,299	31,33,470	37.19	16,376	877	79	17,332
	1980	79,284	1,31,88,970	47,49,083	36.00	21,853	1,123	59	23,035
	1981	76,929	1,60,05,725	80,80,433	50.50	24,675	1,571	91	26,337
	1982	72,860	1,39,20,601	81,20,014	58.33	20,691	1,560	36	22,287

Note.—Figures for 1982 are upto November only.

\* O/S—Outsiders.

\*\* R/E—Railway Employees.



## CHAPTER V

### RAILWAY PROTECTION FORCE

#### 1.0. Scrutiny of the Force.

1.1. Chapter I already delineates the growth of Railway Protection Force from the advent of watch and ward staff in 1982 on the Company Railways which functioned upto 1957.

1.2. The strength of RPF as indicated in Chapter I\* has increased from 31,000 in 1951 (when they were watch and ward) to 67,000 in 1981-82. During the same time the expenditure on its upkeep has become 16 times from about Rs. 3 crores in 1951-52 to Rs. 48 crores in 1981-82.

1.3. The functioning of the force has been subjected to scrutiny by several Committees and the details of these Committees and their work has been discussed in paragraphs 5.0 to 7.4 of Chapter I.

1.4. The Enquiry of 1921 found the functioning of the force ineffective, the main reasons being: watchmen are residents of their area of work and have contacts with local bad characters who are involved in pilferages; inadequacy of supervision and lack of organisation; of sense of training facilities; inadequacy of housing and absence of a proper system of recruitment etc. Consequently some organisational changes did materialise, but these were not uniform and varied from Railway to Railway in the absence of any central cohesive nucleus.

1.5. The force continued to be ineffective in achieving its basic objective of protecting the property of the Railways. The proximate cause of this failure was the poor standard of discipline in the ranks which was traceable to the unsuitability of the ordinary Railway Disciplinary Rules, which were applied equally to all the staff. These rules did not permit meeting out deterrent-enough punishments and the formalities required were elaborate. There was also lack of legal powers and want of status as these staff were not treated like other public servants performing similar roles.

1.6. The creation of the Railway Protection Force in 1957 was, therefore, expected to get over the drawbacks listed above and to simultaneously provide a separate code of discipline, and increased powers of control. The status of public servants within the definition of Section 21 of the Indian Penal Code was also accorded to them.

1.7. B.N. Lahiri, Adviser to the Railway Board, during the transitional years of the formation of RPF, recommended granting of limited powers of arrest in respect of offences of certain categories committed within the Railway premises. It was envisaged that the force should be given powers for taking in to custody without warrant, within the railway premises, any person in whose possession anything was found, which might reasonably be suspected to be stolen property, subject to the condition that such a person was to be sent to the

Railway Police immediately. Powers were also recommended for seizure of any article reasonably suspected of being stolen, and detention/search of any person reasonably suspected to be in possession of stolen property. Lahiri envisaged these powers in addition to the powers available to the force under the Railway Act, and as a private individual, under the Indian Penal & Criminal Procedure Codes.

1.8. Evidently even at the time of inception of the Force, a slightly larger role was envisaged for the watch and ward staff than was available in practice.

1.9. Under the Railway Protection Force Act of 1957 (23 of 1957), the objective was limited to "better protection and security of railway property". The Act specifically defined the duties of every superior officer and member of the force :

#### Duties of Members of the Force

11. It shall be the duty of every superior officer and members of the Force :

1. promptly to execute all orders lawfully issued to him by his superior authority;
2. to protect and safeguard railway property;
3. to remove any obstruction in the movement of Railway Property; and
4. to do any other act conducive to the better protection and security of Railway property.

1.10. Powers of arrest without warrant of persons concerned in offences relating to railway property punishable with imprisonment for a term exceeding six months were given and also in the case of any person found taking any protection to conceal his presence within the railway limits where there was suspicion that this was for committing a theft. It also provided for powers to search offenders who committed or attempted to commit offences against railway property without a warrant in cases where a search-warrant could not be obtained. After the arrest, the person had to be taken to a regular Police Officer.

1.11. Evidently, at the time of passage of the Railway Protection Force Act, the role of the force was limited to the protection of property alone and the idea of vesting them with the enlarged powers was not favoured, and thus dropped.

1.12. As the crime situation continued to deteriorate, it became necessary to pass the Railway Property (Unlawful Possession) Act, 1966 to prescribe a penalty even for possession of railway property, and the burden of proof of his bonafides was squarely laid on the person on whom the property was found. Similarly for dealing with stolen property, the Act also covered the owner

\* Cf. Table I.1,



or occupant of the land or building and his agents. The powers of arrest without warrant were given subject to the stipulation again, that the offenders will be forwarded without delay to the nearest officer. This Act also provided for the officers of the Force to enquire into charges against persons arrested by an officer and for this purpose the powers of the officer-in-charge of a police station for investigation of cognisable offences were given. Powers to summon persons for giving evidence and produce witnesses were also given.

1.13. In a quintessence RPF derives its powers and jurisdiction from the following statutes :

1. Indian Railway Act, 1890 (9 of 1890).
2. Railway Protection Force Act of 1957 (23 of 1957).
3. Railway Property (Unlawful Possession) Act, 1966 (29 of 1966).

1.14. Section 10 of the 1957 Act accords the limited status of a 'Railway Servant', to the Officer/Members of the Force as defined by Indian Railway Act 1890, and empowers him to effect arrests in certain offences such as ticketless travelling, committing nuisance, obstructing railway servants in their duties, damage to or destruction of certain railway property i.e. track, bridges, station building etc.\*

1.15. The Railway Property (Unlawful Possession) Act of 1966, confers on officers of the RPF authority to conduct enquiry into the offences under the Act and to prosecute the offenders. This permits them to act independently only for a few limited offences. For all other investigations they have to depend on the Railway Police, that is the GRP.

## 2.0. Usefulness.

2.1. A study of the claims bills paid together with value of damages to railway property indicates a steady rise. This does not speak of the effectiveness of RPF in complimentary terms.

2.2. Chapters II & III deal with the force being increasingly used for activities not directly enjoined by the statute and not concerned with the protection of property. These are escorting of passenger trains and checking alarm chain pulling and ticketless travelling. The R.P.F. regulations, however, do provide specifically† for the force being used to assist the Traffic Department in checking the ticketless travellers. The Railway Board have lately advised that these regulations do not have the sanction of the RPF Act and have in certain cases been held ultra vires. To the extent found necessary appropriate statutory amendments should be arranged.

2.3. We have already recommended that for ticketless checking and alarm chain pulling drives, the Railway should continue to depend mainly on civil police. We have also recommended that the escorting of trains should not be done by the RPF and should be done by GRP and for this purpose, we have recommended the establishment of mobile posts in the trains in phases and to begin with in the mail and express trains during night time in the vast vulnerable areas of the North and North East in particular.

2.4. The future role of the RPF can, therefore, be laid down as follows :

1. for the primary objective of protection of property.
2. for the secondary objective, albeit in a limited way for assisting ticketless checking, alarm chain pulling activities etc. as required.
3. for gathering and providing intelligence to the concerned superior officers for its primary and secondary functions and for identifying the bastions of criminals.

## 3.0. Weaknesses.

3.1. RPF appears to have grown as an independent entity, frequently divorced from the mainstream of railway performance. This aspect has been discussed in detail in R.B. Lal Committee's Report. In an effort to establish authority of an uninterrupted chain of command, it functioned outside the control of Divisional Superintendents (now Divisional Railway Managers). Until recently the Divisional Superintendents had no say in assessing the performance of the Security Officers, which implied that coordination had to be done with the Chief Security Officers. The Board only in October 1981, have decided that the Annual Confidential Reports of both sections 1 and 2 of Security Officers posted on the Divisions should be Written by Divisional Railway Managers though no separate column has been made for this in the ACR form. We support this wholeheartedly.

3.2. At the top level, the Force is, however, under the General Manager, but not fully as the appeals by RPF staff against the orders of the Chief Security Officers lie to the Inspector General of Police Railway Board. Such a development has accentuated a feeling of independence and isolation combined with certain amount of aggressiveness.

3.3. We also feel as discussed in chapter I that in view of the interface with the Commercial Department, the Commercial Officers should also have some say in the functioning of the force. At the same time on the same rationale, in Workshops and other independent Units, the force should own responsibility to the Head of the Unit.

3.4. In making the above recommendations we have considered the fact that the RPF has come to have a unique status. Elsewhere the staff engaged in protection of property is seldom made to take over policing functions in respect of crimes committed against property. The Chowkidars and the Police have been merged here. We feel that this is unsatisfactory and is in a way the proximate cause for increased involvement of RPF personnel in thefts as already discussed in paragraph 4.4, Chapter IV page 108. It seems desirable that the force should have two distinct departments of Protection and Crime. While both the departments would be under the Divisional Railway Manager and the General Manager like any other department it would imply that the Protection wing will have no say in the investigation of crimes.

3.5. In Chapter I, we have already covered the various Enquiry Reports and have indicated the

\* This refers to Section 131 of the Indian Railways Act of 1890, which provides for arrest without warrant by any railway servant or police officer of persons committing offences men-

tioned in specified sections therein.

† Chapter II, para 8 of RPF Regulations of 1966.



recommendations of the High Powered Committee and the Kripal Singh Committee, which have not been accepted. The latter Committee made certain specific recommendations discussed in paragraph 7.4, Chapter I, page 17, referring to the organisational matters, which have not so far been implemented. These recommendations pertain to Development of a separate cadre of Class I Officers for RPF, the mode of recruitment of Assistant Security Officers, removal of restrictions placed in the Railway Protection Force Recruitment Rules 1974, granting of the status of Director General to the Head of the Railway Protection Force or a special pay of Rs. 250.00 per month, upgrading of the posts of Chief Security Officers on the Railways and upgrading of the posts of the Deputy Chief Security Officers on certain Railways. In view of our recommendations for basic organisational and functional changes in RPF and GRP, we feel that these recommendations are today out of tune with actual requirements. These, therefore, in our opinion, need not be pursued by the Government.

#### 4.0. Manpower.

4.1. It is true that the operations of the Indian Railways have grown and so would the challenges in the years ahead. However, the growth of the RPF organisation cannot arithmetically be related to the growth of freight and passenger traffic. With the emphasis on modernisation of operations and the need largely to run point to point trains, with higher pay-load wagons, the increase in strength has to be carefully assessed. The Kripal Singh Committee had recommended that a work-study should be undertaken to lay down a yardstick for assessing the man-power of RPF and that at the time of planning new assets, the security requirements should also be kept in mind. We learn that the Railway Board in 1978 had appointed a Committee to study the man-power requirements of RPF by a detailed work-study. The Committee have submitted their report, which, under the instructions of the Board, has been remitted to the Efficiency Bureau of the Railway Board for further consideration. An early decision should be taken in the on pragmatic considerations. In doing so, we recommend that for the essential assistance to be extended to the Commercial Officers at the time of ticketless/anti-alarm chain pulling drives, requisite provisions should be made under RPSF.\* They can be utilised on reserve duties when not engaged in such activity.

#### 5.0. Cadre and staffing of management.

5.1. The Force is under the overall control of an Inspector General of Police who enjoys the status of Head of Department in Level I in the existing set up of the Board. In the evidence before the Committee, a higher rank for the head of the force and the Chief Security Officers has been suggested, particularly by persons connected with the force at present or in the past. In this connection recommendations of Kripal Singh Committee have also been quoted. We have, after a careful consideration, felt that the existing set up is in keeping with the organisational structure and is satisfactory for the maintenance of coordination with the sister Directorates in the Railway Board and the Departments in the Railway Zones. We, therefore, consider that the I.G. should continue to be a Director as of now, and continue to be called I.G. RPF and Director of Security. Similarly on the zonal railway's level, we do not feel any need for changing the existing hierarchy, and the Chief Security Officer should continue to head the Security Organisation except that the requisite nexus with the Commercial Department for closer coordination as already recommended should be established. As for the number

of Officers in the Division, however, we strongly recommend that this should be adequately strengthened in the vulnerable areas and in other areas on the Railways. The field network is very important and it should be recognised as such.

5.2. An allied issue is the recruitment of officers for the superior posts. We understand that the Railway Board have lately decided to recruit some officers direct to the Class I category. This is also based on the recommendation made by the Kripal Singh Committee (Recommendation No. 133). This has primarily been done to improve the calibre of the Assistant Security Officers and to create a pool of officers who can subsequently rise to man the superior posts. Up till now the posts in top echelons have been filled by deputation of officers from the Indian Police Service. We feel that by continuing the practice of taking IPS officers on deputation to man posts of RPF, this coordination can be achieved to a better degree than by creating a separate Class I cadre. If these Officers do not belong to the IPS cadre, which controls the State Police, the required coordination would be more difficult to achieve. Considering the existing situation of law and order and the possibility of its getting worse, such coordination should be an important factor.

5.3. We, therefore, do not recommend the creation of the Class I cadre of Security Officers for the Railways. We feel that the posts must be filled by deputation from the IPS. It is understood that adequate number of IPS Officers have not been available in the past for manning the RPF and of requisite calibre. This deficiency should be corrected by a positive addition to the recruitment of IPS Officers, taking into account the requirement of the RPF as a regular stream.

5.4. One factor responsible for poor shape and calibre of the officers of the RPF is that the cadre largely consists of promotees from subordinate ranks. The deputationists from the IPS only fill the top posts. According to the figures for the year ending 1981, out of a total of 67 posts in group A only 10 belonged to the IPS cadre. Even two Chief Security Officers were from promoted ranks. In other words, the cadre largely consists of promotees. We feel that this configuration requires to be changed substantially which is possible only by the induction of IPS Officers in the ranks of Asstt. Security Officers and the Security Officers. In saying, so we do not recommend that the existing RPF Officers should be replaced. The building up the quality of the cadre should be a gradual process, but substantial number of directly recruited persons should be in the force within the next 2 to 3 years which would coincide with appropriate expansions in the force. Twenty five percent of the Inspectors should also come off short-term deputation from the State Police.

5.5. The other categories in which direct recruitment takes place is the category of Sub-Inspectors and Rakshaks. Here also, the calibre is below standard as compared to other police personnel in para-military forces. The educational qualifications for the recruitment would have to be raised. The minimum educational qualifications for Sub-Inspectors should be a graduate degree and for Rakshaks, a matriculation certificate. The age at the time of recruitment of Rakshaks may be limited to the ages of 18 to 21 years and the physical standard should be the same as for other police forces.

5.6. Senior police officers in their report have adversely commented on the extraneous pressures being

\*We do not visualise this as a permanent arrangement, but this will be essential in the take-off stage



exerted at the time of recruitment. The force can be effective only if undesirable or unqualified persons do not find entry into the junior ranks. One result of such a pressure has often resulted in relaxation in the educational qualifications and in physical standards. Such relaxations must be prohibited except possibly in the case of recruitment of sons/wards of officers and men of RPF who die/suffer incapacitation in the discharge of their duties.

#### 6.0 Basic issues on personnel/development.—

6.1. As different aspects of training and manpower development will be covered by us in detail in our Report on Personnel, we do not want to do it in relation to RPF here, except for mentioning a few basic issues. The training for RPF requires to be vastly improved. The present arrangements comprise the training establishment for initial training of Rakshaks and for promotion courses separately in each Zonal Railway. In addition, a training college at Lucknow imparts initial training to directly recruited Sub-Inspectors and other higher ranks.

6.2. We have already recommended the RPF being manned by directly recruited Class I Officers from the IPS cadre. However, some percentage of the posts in the middle management level would get filled by selection processes from the lower ranks. For senior management posts, e.g. Chief Security Officers and above, normally IPS officers should be considered. A general familiarisation course for IPS officers, when they come to the Railways, should be organised by Railway Staff College, Vadodara, to accelerate their process of assimilation. For other officers from the ranks, special courses should be organised at the National Police Academy for giving them appropriate training.

6.3. For Class I officers, presently, the cadre consists of a large number of promotees and no special training has been given to them. After assuming higher responsibilities, we feel, there is an urgent need for imparting special training to these officers by organising a course of about three months at the National Police Academy in consultation with the Ministry of Home Affairs. This should be organised in batches, so that all such officers would be fully covered within the next two years.

6.4. The Training College at Lucknow and in the Zonal Railways face common problems of having instructors of inadequate calibre and competence. Since such problems are common to the training establishments for all other categories of railway staff, the action to be taken to overcome these shortcomings which strategy is common for all training establishments will be discussed in detail in later Report.

6.5. One specific point relating to RPF should, however, be made here. In view of the basic responsibilities of RPF staff in commercial affairs, posting of a few experienced Commercial Officers as Instructors for imparting training of commercial procedures and regulations to the RPF ranks is essential. This itself, we are confident, will lead to a better rapport and greater understanding with the staff subsequently. This recommendation may be implemented forthwith.

#### 7.0. Coordination with GRP.

7.1. The need for the RPF to have a close coordination with the GRP requires no emphasis, primarily because of the fact that for law and order problems, for protection of the passengers and their property, and for investigation of cases initiated by the RPF relating to railway property, it is the GRP, who have

to play a key role. In Chapter I, the lack of cooperation between the District Police and the Government Railway Police has been discussed. The problem of coordination between the RPF and the GRP is of a more complex character. While the GRP and District Police belong to the State and have equal powers, the RPF belongs to the Centre and it does not have the powers of a Police Force. The very fact that it has not been possible to achieve the desired coordination even between GRP and the District Police, despite the problem having been studied right from 1902 onwards, highlights the inherent difficulties in achieving coordination between RPF and GRP, which have different roles, enjoy different scales of pay.

7.2. Some of the specific spheres in which without coordination, the force is bound to be ineffective are :

1. Investigation and conviction in cases against property.
2. Drives against alarm chain pulling and ticketless travel.
3. Public nuisance in the light of presence of unauthorised beggars, hawkers and vendors both at the platforms and in the circulating areas.
4. Coming to the help of each other when in a situation, they are not for from each other.

7.3. The RPF have only powers of arrest and some powers of investigation under the Railway Property (Unlawful Possession) Act, 1966. They have to hand over the persons into the custody of the GRP. Similarly, they do not have any powers to control riotous assemblies in alarm chain pulling drives, etc. and, therefore, if any incident occurs, they are not legally authorised to take any punitive police action. They are also not protected from any consequences arising out of such an action. As seen in Chapters II and III, increasingly, incidents are taking place, where the drives against alarm chain pulling etc. have resulted in rioting. These are, however, vital spheres for the Railway administration both for giving the desired service to the bonafide traveller and for ensuring the punctual running of trains. GRP/civil police has, therefore, to be necessarily associated with all such checks. Similarly, to curb the incidence of compensation claims and check rampant vandalism, it is necessary that cases against property, where culprits are apprehended by the RPF are carried to their logical conclusion i.e., this should end in conviction. This requires a high standard of investigation and follow up in the course. The efforts of RPF are likely to be nullified, unless there is coordinated follow-up by the GRP/civil police.

7.4. We have already suggested that the Force should be largely headed by Senior officers drawn from the Indian Police Service and we feel that this alone can bring about improved coordination. In addition to this, we also recommend codification of certain rules for coordination between the RPF and the GRP/civil police, so that this is institutionalised. This would mean holding of regular meetings at various levels according to a specified schedule. While the Chief Security Officers should meet the I.Gs of the States every three months, monthly meetings should be held between the Security Officers with their counter-parts in the State. Further below on the field level, We would recommend provisions in the Regulations both for the GRP/civil police and the RPF that these forces will come to each other's assistance. In case the assistance is denied, this would have to be discussed in the coordination meetings.

7.5. We have been advised that the Government have already taken a decision to set up Standing Committees



mittees at the State level comprising representatives of Civil Police, RPF, GRP and Railway administration, for ensuring coordinated working. It has also been provided that local committees could also be formed. We also understand that Bihar, Assam and Gujarat have already set up State Level Committees, and Bihar has even gone ahead by also setting up local level committees. We have, however, observed that the Committees comprise as many as fifteen officers in certain States e.g. in Bihar State, and do not have a set and uniform pattern either in their structure or in their functioning. Their terms of reference have not been laid down. We welcome the setting up of these Committees, but feel that their powers and the terms of reference should be specified, so that the discussions could be held in a meaningful manner and implemented. Unless this is done, these Committees will be reduced to the multifarious advisory Committees which are more for adornment than for positive and pragmatic action. These Committees should also of course meet at regular intervals.

#### 8.0. Coordination with State Police.

8.1. Problems have arisen because the GRP is organised on the 'provincial' system and is not under the control of District SPs. Therefore, it becomes necessary to seek the coordination of the District Police in dealing with crimes against Railway property. The criminals, who operate in the Railway premises, have ultimately to be nabbed and for this most times have to be watched by the District Police. While the primary matter pertains to the coordination between the GRP and the State Police, which would be discussed in a later chapter, it is necessary at this stage to stipulate that the RPF would also have to maintain intimate contacts with the District Police to be effective in their dealing with criminals. This would have to be achieved by adopting all the measures, which are suggested for ensuring co-ordination with the GRP. In fact, the success of the anti-alarm chain pulling and ticketless drives would depend upon the assistance of the Civil Police, for which a positive efforts would be required on the part of the RPF and the Railway Officers to establish workable equations with the District Police and their State levels. This would, however, get resolved with the merger of GRP with the district police as proposed.

#### 9.0. Limitations of Power.

9.1. The Committee have been advised by senior and knowledgeable officers of the Railway Protection Force that one of the main reasons of the failure of the Force in its ability to check the incidence of crime is the very limited powers enjoyed by the Force under the Railway Protection Force Act, 1957 and the Railway Property (Unlawful Possession) Act, 1966. It has also been argued that coordination alone with the GRP would not provide a sure remedy as coordination can best be achieved among equals. As the two forces are unequal to each other, in their power and authority, any amount of institutionalisation may not get over this inherent weakness. The question, therefore, arises as to whether the RPF should be provided with powers equal to those

of the GRP. The present powers available to the RPF suffer from the following lacunae :

1. The Railway Property (Unlawful Possession) Act confers on the force authority to deal with offenders, who are arrested and found in possession of unlawfully obtained Railway property. It is common experience that recovery of stolen property is not easy without some investigation. Such an investigation will require establishment of identity of the offender and the place where the affected property is stolen and/or kept. The same Act restricts action against persons conniving on the receipt and disposal of unlawfully obtained railway property as only owners/occupiers or the agents of the buildings, land and vessels used for the storage of such unlawfully obtained property have been made liable. All other persons conniving in the actual commission of crime have been left out.

2. The RPF Act of 1957 states that persons committing cognizable offences against railway property or concealing their presence can be arrested by the RPF but thereafter can only be dealt with by the Police. This implies that at the time of arrest, it is at present not legally possible for the RPF to gather and record the evidence, which, later on, may or may not be available and has a fair chance of being lost, as the arrest is often not in the vicinity of the police and in the meantime witnesses can and do disappear.

9.2. The question of enhancement of legal powers was discussed in detail by the high-powered Committee and by the Kripal Singh Committee. The High Powered Committee suggested repeal of the Railway Property (Unlawful Possession) Act and replacement by a more comprehensive Act after creating certain special offences relating to railway property at the same time giving power to investigate into such offences and to prosecute persons accused thereof to the officers of the RPF.

9.3. The above Committee relied, while making such a recommendation, on the fact that the Parliament was competent not only to define and create new offences on the subject matter of the Railways and carriage of passengers and goods by them, but also to make a law prescribing the procedure for the investigation into commission of such offences and for the prosecution of persons concerned in such offences. The Committee held that members of the Railway Protection Force could be vested by a statute with powers relating to the Railways under the Code of Criminal Procedure, similar to those exercised by the State Police. They cited the examples of the Railway Property Act of 1966, which created two new offences under Sections 3 and 4 and vested powers to the members of the Railway Protection Force under Section 6 to arrest without warrant. It also permitted members of the Force to investigate offences under Section 8\*. They concluded that "there is little doubt that this legislation is covered by entries 22,30 and

\* Section 8 of the Railway Property (Unlawful) Possession Act, 1966, is reproduced below :

- (1) When any persons is arrested by an officer of the force for an offence punishable under this Act or is forwarded to him under Section 7, he shall proceed to inquire into the charge against such person.
- (2) For this purpose the officer of the force may exercise the some powers and shall be subject to the same provisions as the officer incharge of a police station may exercise and is subject to under the code of Criminal Procedure, 1898, when investigating cognizable case: provided that.—
  - (a) if the officer of the force is of opinion that there

is sufficient evidence or reasonable ground of suspicion against the accused person, he shall either admit him to bail to appear before a Magistrate having jurisdiction in the case, or forward him in custody to such Magistrate ;

- (b) if it appears to the officer of the force that there is not sufficient evidence or reasonable ground of suspicion against the accused person, he shall release the accused person on his executing a bond, with or without sureties as the officer of the force may direct, to appear, if and when so required before the Magistrate having jurisdiction and shall make a full report of all the particulars of the case to his official superior.



93 of the Union List and entry 2 of Concurrent List". It cited yet another example of Section 16 of the Central Reserve Police Act, which empowers the Central Government to confer or impose upon any member of the Central Reserve Police any of the powers or duties conferred or imposed on a Police Officer of any class or grade by law. Under this Section, Ministry of Home Affairs conferred in 1958 certain powers of a Police Officer under the Code of Criminal Procedure on the members of the Central Reserve Police Force.

9.4. In addition to the repealing of the Railway Property Act, the High Powered Committee also suggested amendments to the Railway Protection Force Act 1957, the more important of which are indicated below :

1. The preamble to the Act was to be changed to make it clear that it was intended to provide for investigation of offences against railway property, in addition to protection and security.
2. A new provision was to be inserted in the Act empowering the Central Government to confer upon any member of the Force any of the powers or duties conferred or imposed on a Police Officer under the Code of Criminal Procedure Act, 1898, or any other law.

9.5. The Committee went to the extent of saying that by conferring the power of a Police Officer, the RPF would also get equipped to deal with riotous assemblies. It also suggested that powers conferred on the Sub-Inspectors of Police under Section 127 and 128 of the Code of Criminal Procedure should also be extended to officers and other ranks of the RPF. It also suggested substitution of Section 14 of the Railway Protection Act to clarify that any case instituted on a report of a member of the Force shall be deemed to have been instituted as a Police report within the meaning of Section 251 of Code of Criminal Procedure.

9.6. This Committee had mentioned that arising out of the recommendations of the High Powered Committee of 1966 the recommendations made and referred to above were not acceptable to the Ministry of Home Affairs and the Ministry of Law and Justice. The main arguments against the acceptance were that :

1. Guilty persons may be railway employees themselves and any agency under the administrative control of the Railways would not be able to handle the investigations.
2. The powers contemplated to be given related to entry 2 of the State List and the Attorney-General felt that it was an encroachment on the State Powers.

In 1975, however, it appears that the Ministry of Law and Justice agreed to the conferment of powers of investigation in respect of offences suggested as this was permissible in the light of the powers conferred on the Force under the Railway Property (Unlawful Possession) Act of 1966. This Committee therefore, recommended that concurrent jurisdiction should be permitted to the Railway Protection Force in respect of the following offences :

1. Theft
2. Extortion
3. Robbery
4. Dacoity
5. Misappropriation

6. Receiving Stolen Property
7. Cheating
8. Frauds
7. Burglary
10. Forgery; and
11. Falsification of Accounts.

The Kripal Singh Committee did not agree to the conferment of powers under Sections 151 and 152 of the Code of Criminal Procedure, as recommended by the High-Power Committee, "to arrest persons designing to commit a cognizable offence or to prevent injuries to public property etc." It also did not favour the granting of "police powers" under the Code of Criminal Procedure on the superior officers and members of the Railway Protection Force.

9.7. The whole issue impinges on the role of the RPF envisaged for the future. We have recommended a primary role of protection of Railway property and a secondary role of the force being used for ticketless and alarm chain pulling drives. It is in this context that powers have to be vested in this force to make it effective. We recommend that the force should be given the required powers to permit it to conduct preliminary investigations in all crimes against railway property. We are confining the force to preliminary investigations with the specific intention of enabling it to take and gather evidence which is likely to be lost later. This would have to be done by an enactment of suitable legislation. Opinions are divided as to whether this could be accomplished without a constitutional amendment or not. We, therefore, suggest that the matter should be examined by the legal experts and depending upon their advice action initiated accordingly.

#### 10.0. Intelligence.

10.1. The RPF staff is engaged in crime intelligence on the zonal railways. This, however, does not appear to be done in a satisfactory manner. The intelligence wings have to be strengthened in terms of manpower, training, and equipment. The intelligence activities have to be gathered in the following specific spheres :

- (a) Crimes against property including disposal.
- (b) Alarm chain pulling, hose-pipe disconnections and ticketless travel, and other acts of interference with the running of trains.

We have indicated earlier that even for alarm chain pulling, the main leaders are few in numbers and if identified and nabbed, the menace can be controlled. The same can be tried for ticketless travel. In addition, we have already recommended placing of some RPF staff in the Claims Prevention Cell for making that organisation more effective.

10.2. Intelligence activities require a higher calibre than the ordinary duties. We have, therefore, no hesitation in saying that these posts should be treated as prize posts and the posting to this wing be treated as a positive recognition of competence and good work. We also recommend that some incentive should be given for such posts.

#### 11.0. Statistical Coordination Cell for crime and interference.

11.1. A Central Crime Bureau exists today for maintenance of statistics, compilation of personal records and furnishing information on matters relating to Railway



crime. It also is meant to conduct inquiries in cases of crimes of complicated nature and collection of intelligence about the activities of criminals. All these functions are now being discharged by this bureau.

11.2. We recommend a major reorientation of this bureau under a new nomenclature of Statistical Coordination Cell for Crimes. We feel that this cell should have a comprehensive record of criminals operating on the railway net work and indulging in any kind of crime. While we have not recommended any powers for dealing with crimes against passengers and their property to the RPF, we feel that compilation of record of such crimes has to be centralised and this can only be done under the aegis of a new cell to be controlled by the Railway Board through IG, RPF.

11.3. In recommending the establishment, we realise that all the States may not have adequate machinery to gather statistics. Since the Railways function as one unit and their span crosses State jurisdictions, this, of necessity, will have to be a centralised activity.

11.4. We recommend the establishment of the cell on a scientific pattern equipped with modern aids from the beginning. We also recommend that with computerised aids, this bureau must undertake the responsibility of ascertaining whether an offender has been previously convicted in a crime against the Railways, and if so to seek enhanced punishment for subsequent offences of a repetitive nature, as permissible under the law. Presently the Railways do not know whether a criminal has been committing repetitive offences of any kind and are not seeking enhanced punishment in such cases.

## 12.0. Conclusion.

12.1. Despite a substantial growth of the Railway Protection Force, it is difficult to say that it has achieved its aims. The force has been ineffective, and its performance lukewarm and sometimes even retrograde, despite organisational changes of a far-reaching nature and its being vested with some increased powers over the years.

12.2. The future role of the force would continue to be limited to the primary objective of protection of railway property and the secondary objective of being used for ticketless checking and alarm chain pulling drives. In addition it has to be suitably strengthened for gathering intelligence.

12.3. The force appears to have grown as a semi-independent organisation and action has to be taken to merge it fully with the existing fabric of the railway system. This would mean that like the Divisional Railway Managers, the General Managers would also given complete control over the activities of the force similar to that in other departments. The existing anomalies in this regard should be eliminated.

12.4. The Railway Board must take a decision on the strength of the force after laying down a yardstick, for the manpower requirements of RPF. In doing so they must also take into account the future pattern of operations of bulk commodities being carried on point to point basis with trains of higher trailing loads. The limited work visualised for this force for ticket checking drives should also be included in deciding the requirements, but this number should be created in the Railway Protection Special Force (Cf. para 4.1 ante).

12.5. The status of the RPF officers in the Board and the Zonal Railways may remain unchanged, but for strengthening the organisation in the Divisions, necessary action should be taken. The recruitment of officers directly in Class I for the Railway Protection Force should be given up. The force should continue to draw its major requirements from the Indian Police Service Cadre. For this purpose, the Railways, requirements should be included in the annual recruitment for IPS.

12.6. The educational qualifications for the recruitment of Rakshaks and Sub-Inspectors should be raised. The existing practice of relaxation being accorded under 'special circumstances, should go and such exceptions made only in the case of the dependents of the staff, who die in the discharge of duties or suffer incapacitation.

12.7. Senior Commercial Inspectors may be posted in the Training Institutes to impart training in commercial procedures and regulations to RPF officers.

12.8. The coordination between the RPF and the GRP should be institutionalised by codification of rules. Meeting with regular periodicity should be held at various levels and the regulations of the GRP and the RPF should provide for extending to each other the required assistance, which, if denied, should be discussed in the meetings. The Committees for this purpose should be set up on a uniform pattern and their terms of reference should be laid down.

12.9. The RPF should be vested with powers for conducting preliminary investigations in cases against property and a suitable legislation to permit them to do so should be enacted. This should be implemented even if constitutional amendment becomes necessary.

12.10. The intelligence activities in respect of crimes against property and other acts of interference with the trains have to be organised in a professional manner. For this purpose, really competent and outstanding personnel should be posted to this branch and they should be given adequate incentives.

12.11. A Statistical Coordination Cell for Crimes should be created in place of the existing Central Crime Bureau with the specific purpose of having a comprehensive record of criminals operating on the railway network. This should include crimes against Passengers and their property



## CHAPTER VI

### GOVERNMENT RAILWAY POLICE

#### 1.0. An overview.

1.1. In Chapter I, while outlining the genesis of the GRP\* we have indicated the extensive neglect it has suffered in its development over the years.

1.2. GRP is the primary agency dealing with crime on the Railways. As seen in Chapter V, RPF exists only "for the better protection and security of railway property."† The cases registered by RPF have to be investigated by GRP. The duties of GRP have more or less remained unchanged since 1907 when they were re-defined as 'crime' and 'order' duties. These are already indicated in Annexure A-1.1. @

1.3. The cost of the police engaged in 'crime' duties was paid for by the State Governments and that of the staff engaged in 'order' duties by the Railways. This distinction, so far as it determined the payment was concerned, was abolished on the recommendation of the Kripal Singh Committee's Report, and a uniform procedure of Railways' sharing fifty per cent of the cost of GRP was evolved from April 1979.

1.4. It would be clear that it is the functioning of GRP, which determines the security environment on the Railways. It is, therefore, unfortunate that this organisation which is vital to the maintenance of security on the Railways should have suffered neglect in its development and modernisation.

#### 2.0. Organisation.

2.1. GRP has continued to remain stagnant. The strength of GRP has remained unchanged from 1972-73 till 1980-81 as given in Annexure A-6.1 (Page 184). While during the same time the crime has gone up substantially, particularly, against passengers. As would be seen from Table 1.2 to 1.5 of Chapter I, pages 26 and 27, there is a seven-fold increase in respect of heinous crimes. This is based on reported statistics, and it is well-known that the actual incidence would be larger.

2.2. A fallout is the fact that the image of the Railways has continued to be bad, in fact has deteriorated from year to year. Their failure to provide adequate protection to the passenger and his property, besides the Railways' own property, continues to be highlighted both by the Press and in the Parliament. It appears unfair to blame the Railways for functions which they are neither capable of performing nor are authorised to control. The failure of law and order on the Railways is the failure of the GRP, which is controlled by the State Governments, who in fact have the constitutional responsibility for looking after law and order.

#### 3.0. Reasons for failure.

3.1. The deployment of GRP has been, right from its initial stages of formation, on provincial basis and not on district basis. The Police Commission of 1902 recommended the 'provincial system'.‡ Considerable emphasis was also laid on this by the Thompson Committee of 1921, which also upheld its continuance.§—

3.2. It is necessary to go over the reasons, even briefly, which weighed with these two Committees to give a provincial bias to this organisation. The 1902 Police Commission upheld that the province was the unit of police administration, but did not make it a part of the district police as railway police could not be confined to the district limits. It also drew on the experience gained from Madras and Bengal, where the district system had been converted to provincial system with beneficial results and foresaw that in future, district limits would become irrelevant, as the criminal classes started using the expanding rail network. The Commission, however, appreciated that the railway police on the provincial system could be effective only with the cooperation of the District Police and gave a set of rules to ensure it.

3.3. In 1921, the Commission studied in greater detail the question of imperialisation versus the provincial system, which they identified as being the main issue. The Commission rejected the imperialisation system and thus favoured the provincial system. At the same time it also upheld the necessity of coordination with the District Police, but made no attempt to institutionalise it as attempted by the 1902 Commission, which in a certain manner, it undid.

3.4. We feel that the perpetuation of the system has done long-term disservice to the growth and modernisation of GRP. One direct result of great consequence has been the segregation and exclusiveness of GRP from the district force leading to the following aberrations :—

1. Stilted growth.
2. Dumping of inefficient and unwanted personnel into it.
3. Lack of modernisation.
4. Lack of basic amenities such as housing.
5. Absence of involvement of District Superintendents in the crime situation in an important sphere of their territorial jurisdiction.
6. Absence of involvement of State Assemblies and Administrations in railway crimes.
7. Creation of an illusion that GRP is not a limb of the State Government, but is a part of the Central Government (Indian Railways).

\* Cf. Paragraph and 1.15

† Article 3(1) of the Railway Protection Force Act, 1957.

@ Annexure A-1.1 (pages 33 & 34), Paragraph 48 of the Report of Railway Police Committee (1907). Reproduced as Appendix

B of Railway Police Report (1921).

‡ Paragraph 106, pages 72 & 73 of the Report of the Police Commission, 1903.

§ Paragraph 79, page 28, of Thompson Committee's Report



3.5. A meeting was held, as late as in March 1981, by the Home Secretary to discuss improved measures for detection and prevention of crime on the Railways. In this meeting, the desirability of the Railways speedily clearing the pending proposals for augmentation of the GRP was emphasised. In addition, equipping the GRP with better communication and transport, and extending the practice of providing armed escorts during night in the ratio of two armed men for eight coaches, (as adopted in Maharashtra), on all the Railways, alongwith setting up of a Central Control Room to coordinate working of GRP in every State, were the other decisions taken. These decisions, however, have yet to be implemented. As regards the sharing of cost, we have already, in an earlier Chapter, recommended that the concept is a legacy from the Company days, is anachronistic, that this must altogether be given up forthwith, and that the cost should be borne entirely by the State Governments, law and order, as it stands today, being under the Constitution their basic responsibility.

3.6. In the evidence before the Committee, the fact that the force has been largely ineffective in dealing with crime has been stressed by railway officers, public representatives as well as officers belonging to the State Governments. A large number of Chief Secretaries have pointed out the inherent weaknesses of the force which have prevented it from becoming effective. They have been unanimous in their assessment of the total inadequacy of the force and its lack of modernisation. One of the officers who was associated with the RD Singh Panel, appointed by the Police Commission, has indicated that the estimates made by the Panel in 1978 indicated that the strength of the GRP had to be raised from the then existing 19,000 to near about 45,000, \* an increase of more than 100 per cent. In most of the States, particularly the larger ones, it had to be more than doubled.

3.7. While the strength of the GRP has been inadequate in actual practice the availability has been even less than the sanctioned strength and that too, without the provision of leave reserves. The Committee have on random basis selected some figures from stations of Punjab, Haryana and UP and the results are tabulated in Table 6.1.

Table 6.1

Statement indicating the sanctioned strength of G.R.P. and the actual staff available.

Name of Post	State	Sub-inspector	A.S.I.	Head Const.	Constable	Total	Percentage of shortage
Chandigarh	Haryana	a	nil	1	2	8	11
		b	nil	1	2	6	9
Kalka	Haryana	a	2	1	3	17	23
		b	1	nil	5†	7	13
Shahjapur	U.P.	a	4	nil	6	51	61
		b	2	nil	2	25	29
Jalandhar	Punjab	a	1	2	4	23	30
		b	1	2	4	17	24

a— Sanctioned strength.

b— Actual on roll.

3.7.1. The figures gathered by the Committee indicate that the GRP staff functions without adequate availability even against the small sanctioned strength. The morale of the Force is further affected because provision for leavereserve and rest-giver staff is not made in the sanctioned strength. The duty list of staff is such that even at an important place such as Jalandhar, the staff available for patrolling and actual field duty is totally inadequate. Of the working strength at this place of seventeen constables, two work as munshis, five as Havildar sentries, one as Court Clerk and two on summon duties, thus leaving only seven constables for escorting or for crime duties.

#### 4.0. Pros and cons of the provincial system.

4.1. The provincial system has the following advantages :—

1. Availability of exclusive attention to railway crime by an Officer of the rank of Superintendent of Police.
2. Ability of the Railway to establish direct liaison with lesser number of Officers of the rank of Superintendents than in the district system.
3. Availability of proper attention for investigation of crimes on running trains requiring travelling over long distances.

4.2. As against this, it suffers from the following disadvantages :—

1. Long retention of the staff not only destroys their morale, but also causes vested interests and unhealthy association with professional criminals.
2. The improved facilities such as transport, wireless equipment, which are available with the District Police, are not available to the Railway Police, in the same measure.
3. Allotment of staff to the Railway Police gets low priority as compared with the requirements of the District.
4. Organised crime, besides law and order problems from district based agitations, frequently affect the Railways and the Railway Police are incapable of gathering information and controlling without the help of the District Police.
5. Investigation of heinous crimes gets handicapped as the railway police have no root or contacts in areas adjoining railway tracks.
6. The force does not have the back-up facility of reserve force unlike district police.

4.3. With the proposed merger, we definitely feel that the growth of the Railway Police would be commensurate with its requirements and its modernisation would take place, particularly in transport and communications, as has been already done for the other police force.

4.4. The officers cadre in both GRP and RPF (recommended in Chapter V. being drawn from I.P.S., inter-cadre transfers will be easier, and coordination effective between GRP and RPF and GRP and Civil Police

The Report of the Railway Police Panel, 1978, submitted to the Police Commission—Paragraph 7.4 page 35. The calculations were based on a yardstick, which was devised by a Sub-Committee of the conference Coerehe Conference of Inspectors General of Police set up

in 1970, which submitted its report in 1972.

† Excess provided.



## 5.0. The strategy.

5.1. Immediate radical measures are required to revitalise the functioning of the force and the first step would have to be to increase the manpower. It is appreciated that this cannot be done in one stroke. We, however, consider that if serious efforts are made substantial increase may be possible within the next 3 to 4 years so that some adequacy can be achieved.

5.2. Evidently, the provincial structure has failed to achieve its basic objective of providing an effective security network. At the same time the GRP has failed to obtain cooperation or coordination from the State Police: this need was recognised by the Police Commission of 1902 as well as the Committee of 1921 as vital to the sustenance of the system. Mullick in his assessment of the functioning of the railway police even in the fifties had mentioned that the railway police's work had been completely compartmentalised, and that there was hardly any contact between the two wings of the State Police. He also quoted certain examples of spurts of crimes on the Railways in particular areas, which were controlled immediately after the responsibility was fixed on District Superintendents of Police. Apparently, the provincial system which was based on the cooperation between the two wings of the State Police had not only failed in achieving its objective, but also had retarded its growth. We have, therefore, considered that the GRP in each administrative district should come under the control of the District Superintendent of Police.

5.3. The provincial character of the growth of Railway Police has resulted in its becoming a dumping ground for inefficient people, usually, the rejects. In 1921, the Police Commission had commented on the quality of the force and described it as a dumping ground for the inefficient. It further stated the Railway Police Superintendents, and this also applied to the lower officers, were not held equal in importance or interest as a district in-charge. The job conditions were monotonous and involved irregular hours. Most of these observations are equally valid even today. These problems are likely to be reduced only with the merger of the Railway Police with the District Police.

## 6.0. Modalities of introduction of the District system.

6.1. Presently, the GRP is controlled in a centralised manner, headed generally by DIG/Railways. (In U.P., however, there is a separate IG/Railways). The best solution may be to merge GRP fully with the District Police, implying that its independent entity has to be given up altogether. The District Superintendent of Police would become fully responsible for the functioning of the erstwhile GRP thanas like any other 'Thana' in his jurisdiction. Similarly, the DIG of the Range, would be controlling crime on the Railway premises like crime in any other area under his control. The Inspector General or Director General of Police of the State would have the ultimate responsibility for the control of crimes on the Railways like any other crime in the State.

6.2. The merger would result in the following disadvantages :—

1. Cooperation with the Railway at the macro zonal or national level would become difficult as the Railways will have to get in touch with the range DIGs and District Superintendents, though that should not be an insuperable problem.

2. It would not be possible to deal with railway crimes on an exclusive basis as their identity would be lost in the District.

The above mentioned disadvantages exist more in theory than in practice. The basic fact remains that cooperation between the Railways and GRP, even when it has been organised on the provincial system, has not only not been satisfactory, but has been almost absent. How else can it be explained that a large body of senior railway Officers have unequivocally and unanimously commented adversely on the lack of responsiveness of GRP to the needs of the Railways. Many of these officers have strongly pleaded for GRP being put under some semblance of control by the Railways. The Police Officers, on the other hand, have advised against any such step.

6.3. One advantage of the provincial system has been the exclusive emphasis to crimes on the Railways. This again is a theoretical advantage, because it has been of no avail in improving the crime situation on the Railways. The main reason for its ineffectiveness has been the lack of growth of GRP, lack of its modernisation and the ineffectiveness of the system to independently deal with criminals without the help of the District Police. It has to fall back to the District Police without whose cooperation it has been reduced to a position of ineffectiveness. The merger, *ceteris paribus*, is the first step to increase its effectiveness.

5.4. We realise that there is a tendency towards non-registration of crime. A large body of people, in their evidence, have informed us of GRP not registering the crimes properly. In Chapter IV, we have discussed the difficulties in the registration of crimes pertaining to passengers on running trains. The reasons generally advanced by knowledgeable Police Officers for poor registration of cases by Railway Police are the following:

1. General reluctance of the travelling public to assist during investigation for risk of missing the train by which they are travelling.
2. Squabbles regarding jurisdiction not being settled because of place of crime-occurrence not being known.
3. Delays in many cases in reporting the crimes.
4. Shortage of investigating staff to take up investigations.
5. Fear of bad statistical performance, and : therefore, reluctance to register the cases, which are reported.

6.5. Complaints about non-registration have not been confined to public alone. Even RPF have been unable to get all their cases registered at the hands of the Railway Police on one ground or another. Evidence on the South Eastern Railway for Santragachi (GRP Shalimar post), by way of a random sample, indicated the following picture for the years 1972 to 1974.

Table 6.2

Number of cases registered and FIRs lodged at Santragachi/Shalimar G.R.P Post, West

Year	No. of FIRs lodged	No. registered
1972	89	58
1973	137	62
1974	81	51



The trend regarding inadequate registration of crime is a matter impinging on the registration of all crimes and is not confined to the Railways alone. This requires a general raising of confidence of the public in the functioning of the police force. It is essential that certain concrete steps are taken to ensure that registration of crime on the Railways is done properly. Some of the steps, which can be taken, are given below :—

1. Manner of lodging FIRs, which constitutes the first step of the registration of crime, should be simplified by having a set proforma.
2. Where a written account is given, it must be attached to the FIR.
3. The FIR should be serially numbered so that the registration is automatic.
4. Non-registration of crime should be dealt with severely.

Unless deterrent punishments are awarded in the matter pertaining to non-registration of crime, the desired results may not be forthcoming, despite the merger of the GRP with the District system. We do not, however, envisage any insurmountable difficulties in achieving this provided there is political will on the part of the Government to enforce this.

6.6. The District Superintendents of Police, after the merger, would become fully responsible for law and order, all the crime-activities at the stations, in circulating areas and on running trains. While no difficulty is envisaged in dealing with crimes at stations etc., which can conveniently be called static crimes, some difficulties would be encountered in the investigation and detection of crimes against passengers and property on running trains. This is an extremely vital area for improvement of security. The major difficulty would arise because of difficulties in identifying precisely the place of occurrence of crime and the jurisdiction of the District Superintendent of Police, under whom the crime has been committed. With the fast inter-city traffic becoming the major plank of railway's transport in future, the jurisdiction of various 'thanas' would more or less become irrelevant. It would have to be made mandatory that as soon as a crime occurs and is known at the mobile or stationary out-post (when mobile posts have been established in the train), the police post/station receiving the first information will take upon itself to launch immediate proceedings as required under the law for detection of the culprits and gathering of evidence. It will also simultaneously register the case. It is only later, that the jurisdictional element should be brought into play when the cases can be transferred to the appropriate police station.

6.7. Evidence placed before the Committee has indicated that Railway crimes are becoming specialised and would, therefore, require specialised skills for thorough investigation and detection. Already the State Criminal Investigating Department has many specialised wings dealing with various types of offences. Having regard to the gravity of the crimes against persons and their property on running trains and the difficulties likely to be encountered, it is essential that an Exclusive Cell in the State Criminal Investigating Department is established for dealing with Railway crimes. It will imply that after the primary investigations, which will ordinarily be done by the 'thana', nearest to the place of occurrence, in all serious cases the Centralised CID Wing for the Railways would step in and would take over the entire thing, and carry the case through, even in the court of law, as is already being done for such offences. That wing will also be a limb of the Civil Police, and the modality for setting this up and the issues relevant to its functioning may be decided early.

6.8. The Chief Secretaries of the States have almost unanimously agreed in their evidence before us about the scrapping of the provincial system of the GRP and its control by the District Police. Some of the Chief Secretaries have suggested that the existing organisation at the State level need not be destroyed as a result of this merger but could be allowed to be retained.

6.9. Mullick in his report had envisaged vesting the District Superintendents of Police with the operational control of the Railway Police within his district. He had implied that the Railway Police Station would become a part of the District Police system for all practical purposes with the Superintendent of Police being accountable for crime control in the railway premises as for the rest of the district. He, however, vested the administrative control of the railway police in matters pertaining to postings, transfers, discipline etc. to the DIG/Railways.

6.10. We have made a departure from Mullick's observations as we feel that a unified system under the State control, which must be fully responsible for all crimes whether in railway premises or otherwise, is the only system which can function effectively. It seeks to do away with all types of dilutions of responsibilities and to make the District Superintendent of Police in a District, the DIG in the Range and the IG in a State, responsible for everything that happens.

#### 7.0. Modalities of merger.

7.1. We do not envisage any administrative or other difficulties in carrying out this merger quickly. This should be entrusted, for each state, to an Expert Group for forthright implementation.

#### 8.0. Future role of GRP.

8.1. In the post-independence period there had been a definite attempt to confer additional powers on RPF and entrusted it with duties which should legitimately be performed by the GRP. In Chapter V we have not encouraged this kind of development generally. We consider that GRP has to be made effective to discharge its responsibility which cannot be taken away and given to some other body such as RPF. We have, however, visualised the limited assistance which may be required from RPF to assist the Railways in drives against rampant and widespread ticketless travel when adequate civil aid is not forthcoming due to various reasons. We are, therefore, placing a lot of confidence in improved functioning of the GRP in the future.

8.2. The specific role which the Railway Wing of the Civil Police will have to play would cover the following spheres :—

1. Maintenance of law and order in railway premises.
2. Control of crime both in static establishments and areas and on running trains.
3. Escorting of passenger trains and maintenance of mobile posts.
4. Aiding the Railways adequately in their checks for ticketless travel alarm-chain pulling, hose-pipe disconnections and other interferences, even by forming special units or Companies for the purpose.
5. Investigation of crimes against passenger and property.
6. Prosecution of cases investigated.
7. Intelligence functions.



8.3. The spheres in which we are enlarging the association of the Railway Police, which will become a part of the Civil Police in the district, would be provision of active assistance and giving a boost to the staff of the Railways to combat anti-social activities. It is in this light that we have not recommended basically the use of RPF for this purpose except during what may be called emergencies and where the GRP is not readily available. We have, therefore, not considered appropriate to vest RPF with additional powers generally.

8.4. In Chapter V, we have dealt with the reorganisation of the Railway Protection Force. The role we have provided for the RPF is their continuance with the protection of railway property. We have, however, given preliminary investigation powers to ensure that the evidence immediately available is taken note of.

#### 9.0. Coordination with the Railways.

9.1. In the role we envisage for the erstwhile Railway Police coordination with the Railway authorities would be paramount. The Railways will depend heavily on the Civil Police in their endeavour to combat ticketless travelling, alarm chain pulling nuisance, hosepipe disconnection nuisance and such other interferences. They will also depend on them for the maintenance of law and order in circulating areas, on the platforms particularly in cases of agitations where vandalism of railway property is very common. Increasingly, in future, such agitations may take place and would require effective tackling. In addition the image of the Railways which is today unnecessarily sullied on account of heinous crime and crimes against persons and property on the Railways would be retrieved only by the improved and effective functioning of the Civil Police.

9.2. We attach the greatest importance to deliberate and wilful cultivation of excellent relations of the Divisional Officers and the Senior Officers of the Railways with the officials of the District Police. Coordination can be achieved by establishing a personal rapport, which is the surest and the easiest way of doing so. We, however, do not feel that this alone should be done. While the results would be determined by the personalities involved, there is need for institutionalising the cooperation. The general rule made applicable for coordination between RPF and the GRP/Civil Police of holding periodic meetings at specific intervals and the police regulations providing for coming to the aid for the Railways in a specified manner quickly would also apply here. The State Police Regulations, should also specifically provide for extending help in all actions of interference which may result not only in breaches of peace but also where there is likelihood of breaches of law. It should also provide that in cases of disagreement between Divisional Officers and the District Superintendents of Police, both should report to their Superiors and a forthright discussion should promptly be held between the Divisional Railway Manager and the concerned DIG/Police.

9.3. Attempts for coordination between GRP and the District Police have failed in the past and this observation is based on the experience of almost 80 years. It will be imprudent to gloss over this experience which has been a fact of life. The role of personal rapport by Senior Officers, holding meetings on periodical intervals has mostly remained a pious hope; and even though their usefulness must be emphasised and extended it will not be practical to assign to this the role of "a charter of faith."

9.4. We consider 'coordination' extremely important and vital for the success of the new system to be left at

that and would like to introduce a positive element of institutionalisation, particularly, in the working of the force vis-a-vis, the Railways. This institutionalisation inter-alia would require the Railway officials to have an indirect say in the annual assessment reports on the Station House Officers of the Railway Thanas, to be made to the concerned SPs with a copy to DIGs. Such an assessment would be confined to the crime situation on the Railways and would cover the coordination factors.

9.5. We also suggest the following specific acts for institutionalisation of the coordination between Civil Police and the Railways :

1. Each Railway Police Station will maintain a minute book in which requests and suggestions received from the Railway officials would be entered. This would be open to all railway officials.
2. The minute book will be examined frequently by the Superior Officers and the District Police and Civil Administration to ensure that appropriate notice was being taken of these suggestions.
3. The Divisional Railway Managers during their inspection must also visit and look into the functioning of the thanas at the stations. Their reports should go not only to the different out posts visited but also to the Superior police District Police Officers.
4. In the case of all serious law and order occurrences a copy of the report prepared by the SHO will also be sent to the Divisional Railway Manager for his information and action as necessary.

9.6. While the above framework will apply for coordination at the higher levels, at the lower levels also, there is need for intimate coordination between the Railways and the Police staff. The level we refer to, is that of the Station House Officers and the Station Master and Superintendents. As the traffic on the Railways has gone up, many of the Station Masters are senior people and the Station Superintendents are gazetted officers in Class II and Class I (Senior Scale), for example, at Delhi. In the evidence before the Committee it has been mentioned that even at important places the GRP staff do not cooperate with the Railway Staff. The Railway Officers have also indicated that various unauthorised activities which are carried on at the platforms and in the station premises are done with the connivance and sometimes with the tacit approval of the GRP officials, e.g., entry of unauthorised vendors; unauthorised porters; people occupying the compartments when the trains are on the washing lines or in the yard; engagement of reservation touts etc. Instances have been quoted when the Railway Officials who wanted to check such nuisance were harassed by the GRP. While no text book solution can be suggested, we consider that it is necessary that the process of establishing healthy conventions must begin. The GRP should also act as an aid to the Railway officials.

#### 10.0. Location & size of 'Thanas'.

10.1. It is common experience to find GRP Thanas located at the far end of the platform. Not only they have not been given a prominent place, but also they give the impression of 'make shift arrangements'. The space provided is cramped. In fact the lookout is so



small as to be more of a show and cannot accommodate more than two or three persons. While the Railway's primary objective cannot be diluted, and its own service departments have to be given some preference, a more prominent place should be allotted to the 'Thanas'. Adjustments were feasible should be made in the existing stations. Wherever new buildings are constructed a standardised layout with sufficient space for the GRP Thanas should be provided. The same will equally apply for lockups which will have to be made sufficiently large, particularly for meeting the challenges of anti-social drives, where apprehension of a large number of persons may become unavoidable.

#### 11.0. Housing.

11.1. The staff posted with the GRP is neither properly housed nor located in the proximity of the stations. Both these conditions have to be fulfilled to make it effective. One reason, which aggravated housing problems is a change in the policy of the Railways. Previously, the Railways were constructing the buildings and hiring them out to the State Governments for housing of GRP personnel. Under the revised orders, the Railways are only leasing out the land and the State Governments have to construct the buildings. The State Governments have not been able to do so because of their own constraints. The State Governments have, therefore, been asking the Railways to revive the earlier arrangements.

11.2. The housing problems have to be looked at in a wider context. The Railways' own essential staff is not properly housed and substantial resources are required to construct and provide adequate housing accommodation to the essential categories of staff, who are vital to the functioning of the Railways. The constraint of resources has hampered the Railways from taking any satisfactory steps during the last several Plan periods. It does not, therefore, appear feasible for the Railways to provide housing for the GRP personnel at least for the present. This can be visualised only when the Railways have provided with full housing to their own essential staff. The States, therefore, should be given land by the Railways when required so that the housing shortage for GRP personnel can be met in proximity of the stations. When GRP merges with the civil police it may be expected that this would receive the same treatment for housing as is given to the other police personnel who are employed in action posts.

#### 12.0. Communication.

12.1. The GRP 'thanass' suffer from lack of proper communication. They are generally not provided with railway telephones, which we feel should invariably be done in addition to the normal P&T telephones.

12.2. The other weakness, at least in all the major cities, is the absence of wireless sets. Every out-post will have to be provided with this facility so that in case of any crimes, they can pass on information and initiate action quickly. This will also permit the GRP 'Thanas' to maintain constant contact with the mobile posts in the running trains. We have already recommended provision of such equipment in paragraph 2.9, Chapter IV (page 98). In a recent case of dacoity on 30 Down, culprits could be caught because of a quick wireless alert.

#### 13.0. Road transport.

13.1. Road mobility for GRP personnel is virtually non-existent as road transport is not available. The

only State in which it has been provided (recently) is U.P. where jeeps have been provided. We feel that the other States have to follow suit, as for proper investigation in crimes, its prevention and control and even for organising raids for alarm chain pulling etc., this is essential.

#### 14.0. Armed Reserves.

14.1. The Railway Police usually do not have an Armed Reserve Wing of their own and are dependent upon the District Police. This problem would be overcome with the merger with the Civil Police. An allied issue is that of arms. It is considered that modern arms which are lighter to carry, should be available, but this matter has to be looked into for the entire force and no exception need be made for GRP.

#### 15.0. Share of cost.

15.1. The Railways are sharing the cost of GRP on 50 percent basis. The historical genesis of such an arrangement is rather indeterminate. As discussed in Chapter I, the sharing arrangements were imposed when private Companies were operating the Railways and were making good profits. The then Government, therefore, decided that the Railway Companies should share the expenditure for looking after the specialised duties required as a result of the operation of the Private Companies. The law and order responsibility in railway premises or outside railway premises has always been with the State Government. In the post independence period, this issue has been settled by constitutional provisions in the constitution.

15.2. There is no other Department which is so contributing to the maintenance of the force which is entrusted with the responsibility of law and order. Interestingly, the one-man expert committee (Kripal Singh Committee) referred to this problem in some detail.

In retrospect, the system resulted in the neglect of GRP and its being inadequately equipped to deal with the increasing incidence of crime. This was because of the fact that all proposals for augmenting and modernisation required approval of the Ministry of Railways as well to bear 50 percent of the additional cost involved. The States also got into the habit of not pursuing this matter forcefully and the proposals were allowed to linger and lapse. The net loss was that of GRP. The Railways also have not been very forthright in processing such proposals.

15.3. This matter was discussed by the Cabinet Secretary with the Minister of Railways in 1982, and it was decided that the clearance of pending proposals by the Ministry of Railways for increasing the strength of GRP, should be speedily processed by a special cell in the Railway Board.

15.4. A sub-Committee of the Conference of IGs of Police had been appointed in 1970 to consider steps for strengthening GRP, to lay down a yard-stick for determining staff of GRP outposts and stations and to go into the question of providing a Striking Force to be placed at the disposal of GRP. This Sub-Committee submitted its Report in 1972, and made the following principal recommendations :

1. The State Governments and the Ministry of Railways should abolish the distinction between the 'crime' and 'order' wings of GRP.
2. The apportionment of the expenditure of GRP should be 50 : 50.



3. The yardstick suggested by them was to be adopted.\*
4. A yardstick was suggested for the Striking Force.

15.5. This Report was discussed at the Conference of IGs of Police held in April 1972, wherein the recommendations were accepted with the following modifications :

1. The strength of the Striking Force was calculated differently.
2. No GRP Station was to have less than 2 Investigation Officers and both were to be of the rank of Sub-Inspectors.

15.6. As the incidence of crime, particularly in Eastern India, continued to increase, a meeting was called by the then Minister for Railways, wherein the concerned Ministers and other officials of the State Government, Ministry of Home Affairs and the Railways were invited to discuss the situation and suggest remedial action. A Working Group was appointed, which concluded that the strength of GRP was inadequate. The Ministry of Railways, during the deliberations of the Working Group felt that they could not permit any further drain on their revenues in augmenting the Railway Police, as it was not their responsibility. For historical reasons, however, they were willing to keep their contribution at the existing level. Taking this view into account, the Working Group unanimously decided that the Ministry of Railways should approach the Sixth Finance Commission for recommending grants-in-aid to the individual States to cover the additional expenditure required to be incurred for augmenting the strength of GRP on the basis of the yardstick proposed by the Conference of Inspectors General of Police.

15.7. The Sixth Finance Commission, however, observed, in para 19 of their report as under :

"The Ministry of Railways have written to us specifically about the need for strengthening the Government Railway Police. Expenditure in this regard is at present shared between the Ministry of Railways and the State Government concerned and the share of the Ministry of Railways is stated to be about 3 crores out of total annual expenditure of about Rs. 6.50 crores. According to the Ministry of Railways, the total expenditure on Government Railway Police may go up to about Rs. 16.25 crores per annum. To enable the State Governments to bear the additional financial burden, Ministry of Railways have suggested that the same may be taken into account by the Finance Commission. We feel that in view of the higher rate of growth already allowed by us in the reassessment of the expenditure on Police additional provision in this regard cannot be justified. We have also provided for additional financial support to a significant extent to some of the States by way of upgradation grants. In view of the above, it should be possible for the Ministry of Railways and the State Governments to evolve satisfactory arrangements for the strengthening of Government Railway Police."

15.8. The Committee have had the benefit of a discussion with Shri G.C. Baveja, Member of the current Eighth Finance Commission. It appears that the earlier

Finance Commissions (Sixth and Seventh) did not specifically go into the question of sharing the cost because :

1. The expenditure shared by the Railways constituted a negligible per centage of the total expenditure on the upkeep of the police forces by all the States. It does not amount to even one per cent. Also that they may have taken the matter into account in making their recommendations, but did not consider it necessary to deal with it separately as this amount was very small in the overall context.
2. The Commission have treated this sharing as an administrative matter and not as a financial matter.
3. The Railways have not approached the Sixth or the Seventh Finance Commission specifically for doing away with the sharing, thereby giving an impression that the Railways possibly were willing to continue to pay the share, so that they can have some say in the deployment of GRP.

15.9. We consider that the existing sharing of cost is an anachronism. No where else is the cost shared by an agency for the upkeep of a Force responsible for law and order. The present level of funds involved are small in the context of the overall expenditure. This expenditure is bound to increase if GRP's strength and equipment is commensurate with its obligations. More importantly it is necessary to have the arrangement brought in line with the division of responsibilities. We feel that the lag in modernisation of GRP, its required increase in strength and its effectiveness have been impeded by the sharing principle, which, is an inheritance from the Company days. We recommend that the principle of sharing is given up altogether and the cost of GRP is borne in entirety by the States.

#### 16.0. General Improvement and Miscellaneous Matters.

16.1. The GRP has to function in a given environment. We, therefore, feel that both for the convenience of the passengers and for the prevention of crime, the slums in and around stations or around tracks in major cities, which has become a common feature, should be removed. Most of them are on railway land. Stringent action on behalf of the Railways will have to be taken with the support of the State administration. The slums are the breeding ground for crimes. We have separately recommended that the Railways should improve their organisation for better management of the lands under their control, but as a one time measure the eradication of a slums has to be organised even on a higher priority.

#### 17.0. Conclusions.

17.1. GRP, which is the primary agency dealing with crime in the Railways has suffered extensive neglect on its development over the years.

17.2. It has continued to remain a stagnant force, despite substantial increase in heinous crimes.

17.3. The failure of GRP has unjustifiably contributed to the deterioration of the image of the Railways, though the latter have no control over its functioning, and law and order is a State subject.

\* This yardstick laid down briefly the creation of GRP Stations for every 75 cognizable offences investigated by GRP. For

this purpose, IPC and other cognizable offences were treated as one unit and accidental deaths as half a unit.



17.4. The main reasons for the failure of GRP are its development on the 'provincial system' leading to stilted growth, dumping of inefficient personnel, lack of modernisation, absence of involvement of the District Police Superintendents in the crime situation, absence of involvement of State assemblies and administrations in railway crimes, and creation of a mistaken notion that the responsibility lies with the Central Government *v/z.*, the Railways.

17.5. The provincial system, though having certain purely academic advantages, suffers from a very large number of drawbacks and should be scrapped. Instead, GRP should be made a part of the District Police. The proposed merger should result in a much more effective organisation.

17.6. The re-vitalisation of the functioning of GRP also requires substantial increase in its manpower. This should be done within the next three to four years as it is not possible to do it in one shot.

17.7. The merger of the Railway Police with the District Police should not pose any problem even in the existing administrative and functional set-up of the Police force.

17.8. The tendency towards non-registration of crime should be checked by simplifying the manner of lodging FIRs, attaching a written account, wherever it is given and serially numbering the FIR.

17.9. After the merger of GRP with District Police, some difficulties may arise in dealing with crimes, which are not static, but are committed on running trains, primarily because of difficulties in identifying precisely the place of occurrence of the crime and in resolving doubts about the jurisdiction of the District S.P. We recommend that it should be made mandatory to register a crime as soon as it occurs in the Police Station receiving the first information, who should also launch immediate proceedings as required under the law for the detection of culprits and gathering of evidence. When the doubts about jurisdiction are cleared, it could be transferred to the appropriate Police Station.

17.10. To deal with railway crimes effectively, a special cell in the State Criminal Investigating Department should be established.

17.11. The post independence trend to confer additional powers on the RPF and entrust it with duties legitimately belonging to GRP, is not necessary. The GRP must be made effective to discharge its responsibilities in all legitimate spheres.

17.12. The Railways will depend heavily on the Civil Police in their endeavour to combat ticketless travelling, alarm chain pulling, hosepipe disconnections and other interferences with train-running. Coordination between the Railway Officers and the officials of the District Police would be essential. This should be achieved by personal rapport and by holding periodic

meetings at specific intervals. In addition, Police Regulations should provide for coming to the aid of the Railways in a specified and forthright manner.

17.13. The Railway officers should have an indirect say in the annual assessment reports of the Station House Officers by sending the reports to the concerned SPs with a copy to DIGs. This assessment would be confined to the crime situation on the Railways and the coordination achieved.

17.14. The location and size of Thanas would require to be improved.

17.15. The housing facilities for GRP are inadequate. The Railways should give land to the States where required in proximity to the stations who can then construct the houses.

17.16. GRP thanas should be provided with Railway telephones in addition to the normal P & T telephones, and invariably with wireless sets.

17.17. The road mobility for GRP personnel is at present non-existent, Road transport should, therefore, be provided.

17.18. The existing method of sharing of cost of the GRP on a 50 per cent basis requires to be given up. The existing arrangements are anachronistic and irrational. GRP should be recognised as a responsibility of the States, both administratively and financially.

*Annexure A. 6.1*

*(Cf. Para 2.1)*

#### Comparative strength of GRP in the States

States	Year	
	1972-73	1980-81
Andhra Pradesh	1,085	1,120
Assam	735	732
Bihar	1,781	1,991
Delhi	259	341
Gujarat	1,498	1,524
Goa	...	34
Haryana	436	448
Himachal Pradesh	55	56
Karnataka	758	859
Kerala	244	244
Madhya Pradesh	957	1,027
Maharashtra	3,512	3,499
Orissa	366	463
Punjab	564	661
Rajasthan	896	1,184
Tamil Nadu	1,341	1,354
West Bengal	2,341	2,479
Uttar Pradesh	2,509	2,656
Total	19,337@	20,652

@Police Panel (1978).



## CHAPTER VII

### ANSWERABILITY TO PARLIAMENT

#### 1.0. Introduction.

1.1. Constitutional provisions have allotted the subject of 'Maintenance of order' and 'Policing' to the State Governments. This is based on the State List (List II), which, *inter alia*, includes the following :—

1. Public order (but not including the use of any naval, military or air force or any other armed force of the Union or of any other force subject to the control of the Union or of any contingent or unit thereof in aid of the civil powers.)
2. Police (including railway and village police) subject to the provisions of entry 2A\* of List I.

1.2. The Union list or the Concurrent list do not have any entries, which would authorise the Union Government to interfere in the administration of 'law and order' or 'policing'

1.3. As already discussed in Chapter VI, law and order, security of travelling passengers and their belongings, and investigation of cases pertaining to property are all matters within the domain of the Government Railway Police, which is a part of the State Government. The Railway Protection Force has no role to play either by law or by the manner of its creation, in law and order activities or in the protection of passengers and their belongings. It has only watch and ward functions and as discussed in Chapter V, has been vested with very limited powers in relation to protection of railway property and property entrusted to it for carriage. It is evident that the concerned agency for dealing with enforcement of law and order in railway premises and on railway trains is essentially the Government Railway Police.

#### 2.0. Present arrangements.

2.1. A not very realistic situation has developed in relation to the answering of parliament questions in regard to crimes on Railways, including passengers and their belongings. These cover robberies, dacoities, attacks on passengers, theft of belongings of passengers committed in running trains or in the railway premises. Parliamentary questions pertaining to these criminal activities are at present being answered by the Ministry of Railways. The Minister for Railways, who is called upon to answer such questions, has really no control over the machinery set up to enforce law, which is purely under the sovereignty of the State Governments. This practice appears to be divorced from the realities of the situation and the requirement that the Ministry responsible for the functional working should answer questions relevant to the same in the Parliament is not fulfilled. In most cases, the Railway Ministry obtains a situation report from the State Governments and frequently in consultation with the Home Ministry, furnishes the reply to the Parliament Secretariat.

2.2. We understand that the Ministry of Railways have been pursuing this matter with the Ministry of Home Affairs, Secretary, Lok Sabha and the Secretary General, Rajya Sabha, and have suggested that the responsibility for answering questions pertaining to criminal activities on the Railways, excluding theft of railway property, should be transferred to the Ministry of Home Affairs. This suggestion, we learn, has not as yet been accepted.

#### 3.0. An appraisal.

3.1. It is necessary to discuss the reasons, which have been advanced by these agencies for not agreeing to the proposal of the Railways. These can be listed as under :—

1. The safety of passengers and security of their belongings are the concern of the Ministry of Railways.
2. The Ministry of Railways are sharing the expenditure of the Government Railway Police with the State Governments and the Superintendents of Police do not exercise any administrative control over the GRP
3. The Railways have their own network of communication and it is easier for them to obtain information quickly from the GRP stations.
4. The Allocation of Business Rules, 1961, stipulate: "All matters, including those relating to Railway Revenues and expenditure but excluding the Railway Inspectorates and the Railway Audit, are the responsibility of the Ministry of Railways" "All matters" include the safety and security of passengers or goods.
5. The Railways have appointed a number of Committees over the years to look into the functioning of various aspects of crime and have been implementing their recommendations.

3.2. It is necessary to discuss each of the arguments quoted in favour of continuing a tradition established more by convention than by the requirements of the practical situation

3.3. As sufficiently discussed in Chapters V and VI dealing with the RPF and GRP, the safety of passengers and security of their property is not under the control of the Ministry of Railways and they should have no real role to play in this regard.

3.4. The sharing of expenditure is again, as already discussed\*, a pure anachronism and is neither rational nor realistic. We have already recommended that the

\*2A Deployment of any armed force of the Union or any other force subject to the control of the Union or Contingent or unit thereof in any State in aid of the civil power ; powers,

jurisdiction, privileges and liabilities of the members of such forces while on such deployment.

\* Cf. Paragraph 15.1 to 15.8, Chapter VI.



arrangement should be changed. We have also recommended in Chapter VI the merger of the Government Railway Police with the District Police so that the functioning of the GRP is made more effective. However, even under the existing arrangements, the State Government fully controls the GRP.

3.5. The Railways have a network of communication because it is a necessary concomitant of operations. No rail transport system can survive in the absence of such a network. This, however, should not be made an argument for obtaining information for other agencies. As far as the police is concerned, like the Railways, they also have their own network in keeping with their requirements. Even if the Railways can obtain information from the GRP stations quickly the actual position is that these stations are not under the control of the Railways and the impression we have gained is that the cooperation in these matters from the Police is not very forthright.

3.6. A careful scrutiny of the Allocation of Business Rules, 1961, would indicate that 'all matters' in these rules refer to railway operations and should not include law and order activities, which are not within the domain of the Railways or indeed of the Central Government. The words 'all matters' correctly exclude crimes on Railways, involving passengers and their belongings. It can cover only the activities, which are under the control of the Railways. It, therefore, might include questions pertaining to pilferage of railway property, which is in the domain of the Ministry of Railways, because they are controlling the force created to prevent or deal with it. But, even here, the investigating powers are with the GRP. It is relevant to point out that the words 'all matters' have also to be interpreted in relation to other constitutional provisions, particularly the subjects listed in List II of the Seventh Schedule of the constitution. These words cannot alter the fundamental character of the functioning of the Police force. The Railway Police is under the control of the State Government like other State Police. The questions pertaining to police have, therefore, to be dealt with by the Ministry that deals with the State Police i.e., Ministry of Home Affairs.

3.7. It is true that a large number of Committees have been appointed by the Railways to deal with matters relating to crime on the rail system. These have been discussed in chapters I, V and VI. The main reason for the Railways having appointed these Committees has been the concern generated by these crimes to the Railways, more or less in the virtual absence of adequate interest of other concerned agencies. In any case, the Railways have not been able to accomplish anything worthwhile to make the functioning of the GRP effective and these Committees have generally confined their attention to the functioning of the Railway Protection Force, which has been under the control of the Railways.

3.8. We, therefore, consider that the responsibility for answering Parliament Questions relating to Crimes on Railways, other than pilferage of railway property, should vest with the Ministry of Home Affairs. This Ministry can consult the Ministry of Railways, where necessary and expect that Ministry to obtain the necessary information where it is in a better position to do so. Questions relating to 'Railway property' should continue to be answered by the Ministry of Railways while the constitution, control and role of the RPF continues as at present.

3.9. This action would also promote and improve the required involvement of the State Governments and the Ministry of Home Affairs in dealing with matters of crime on the Railways. Unfortunately today sufficient attention is not being paid to the state of crime on the Railways because such questions are not generally raised in the State Legislatures and to some extent because in Parliament they are not answered by the Ministry of Home Affairs.

#### 4.0. Conclusion.

4.1. The present practice of the Ministry of Railways answering questions pertaining to law and order on the Railways does not appear to be correct. The Ministry of Home Affairs should take up this responsibility. This should also promote and improve the involvement of the State Government and the Home Ministry in the maintenance of law and order on the Railways as they do in other spheres.



## CHAPTER VIII

### SUMMARY OF RECOMMENDATIONS

#### Chapter I

##### An Overview

1. Railway security should be looked upon as an ancillary to the main function of providing transportation.

(Paras 8.1 to 8.7)

2. RPF should, like any other department, be under the operational control of the General Manager.

(Para 8.2.1)

3. The Senior Divisional Commercial Superintendents and the Security Officers in the Divisions and the Chief Commercial Superintendent and the Chief Security Officer in the Headquarters should have closer relationship, interaction and camaraderie. Their coordination relationship should be on the pattern, which now exists between the Chief Commercial Superintendent and Chief Claims Officer in the Headquarters and the Senior Divisional Commercial Superintendent and the DTS in the Divisions.

(Paras 8.12.3 to 8.12.5)

4. RPF personnel should be given instruction in broad commercial functions and responsibilities during their training in schools. Competent Commercial Instructors should be posted to these institutes for this purpose.

(Para 8.12.6)

#### Chapter II

##### Ticketless Travel

5. Special checks for ticketless travel should be continuous, widespread and without notice, covering selected trains for limited periods. They must also be repetitive.

(Para 1.8)

6. Rationalisation of the system and facilities for the sale of tickets at metropolitan and city stations and roadside stations is called for.

(Para 3.1)

7. The infrastructure engaged in the activity of issuing of tickets should be suitably improved to reduce the waiting time in the queue for any type of ticket.

(Para 3.2)

8. In metropolitan cities, small computer aids with adequate number of terminal should be made available. Self printing ticket machines to popular destinations should be used in the principal metropolitan station complexes alongwith rationalisation of fares for short distances.

(Para 3.2)

9. Southern, South Central and South Eastern Railways must organise checking of all trains with regular periodicity of atleast twice in a month.

(Para 4.4)

10. A new directorate in the Board should be created to deal with all problems connected with interference to trains, connected policy matters for spearheading and monitoring field drives and campaigns pertaining to ticketless travel, alarm chain pulling, disconnecting of hosepipes, vandalism, and fraudulent practices regarding printing and sale of tickets.

(Para 6.5)

11. The above directorate should also be equipped for itself conducting surprise checks on a massive scale on Zonal Railways.

(Para 6.5)

12. The Committee recommends the appointment of Shri G.P. Mishra, who specialised in such work with credit, on a two year tenure as a Deputy Director in the new directorate to help organise it on the right lines.

(Para 6.5)

13. A uniform policy in regard to the apportionment of the cost on Railway Magistrates and their staff on the basis of 50:50 is recommended.

(Para 6.8)

14. The newly created directorate should also be assigned the task of annually assessing its cost effectiveness by estimating the expenditure incurred for the Special Magistrates, their staff and the Police personnel and the share of the Railways as against the recoveries through the raids and fines from those convicted by the courts.

(Para 6.9)

15. The ticket checking staff should be frequently changed from their place of work to prevent their growing any roots and to reduce the possibility of corruption. Periodically, ticket checking at important stations should be organised by staff drawn from other Divisions/Railways on a much larger scale than has been done hitherto.

(Para 6.11)

16. Concentrated checks on the pattern of 'Operation Barauni' should be revived on a large scale, particularly for vulnerable sections of Bihar, U.P., Upper Madhya Pradesh, West Bengal and other selected areas.

(Paras 7.1 to 7.5)

17. The adequacy of the Travelling Ticket Examiners should be re-assessed consequent on their depletion to man sleeper coaches.

(Para 9.1)

18. At stations with large traffic, ingress and egress of the travelling public must be organised so as to permit Ticket Collectors to check all passengers and collect the tickets, which is not possible today. Plurality of gates with staff should be arranged at stations with large traffic.

(Para 9.3)

19. The checks recommended on the pattern of 'Operation Barauni' should be conducted extensively with the aid of the Civil Police, for which separate and



distinct squads should be created at the expense of the Railways.

(Para 10.2)

20. The Railways should provide clear-cut executive instructions for making the RPF available, as required, by the Commercial Officers and its being placed at their disposal to supplement the District Police, where necessary, particularly in the years of 'take off' of these operations.

(Para 10.2)

21. RPF should be provided with adequate legal powers to deal with the problems arising out of assemblies turning violent or riotous.

(Para 10.2)

22. The States of Bihar, U.P., Madhya Pradesh and West Bengal (North Eastern, Eastern, South Eastern, Central and Northern Railways) should have a number of platoons for ticket checking activities.

(Para 10.4)

23. During the checks, the Railways should make arrangements for issuing monthly season tickets for regular travellers/students for a six month period. Wherever such six monthly tickets are purchased, the persons concerned need not be prosecuted.

(Para 10.5)

24. Initiative for the creation of Civil Police Companies for organising massive and repeated raids should be taken administratively and financially by the Railways.

(Para 11.1)

25. Railways should create adequate number of posts of TTEs, TCIs and Commercial Officers with appropriate arrangements for road transport, etc. for conducting intensive checks. This experiment should, in the first instance, be limited to a period of 24 calendar months. Thereafter, the continuation of the force on the civil side and staff on the railway side should be reviewed and if it is seen that the experiment has yielded sufficient dividends, it should be continued for a further period until normalcy is restored.

(Paras 11.2 and 11.3)

26. The minimum and maximum punishment for travelling without ticket or with improper ticket and for such other ancilliary, fraudulent, irregular and unlawful practices should be raised to Rs. 200/- and Rs. 1,000/- respectively in addition to or in substitution of the punishment of imprisonment already provided therein.

(Para 12.5)

27. The State Government should post requisite number of executive magistrates for being exclusively deployed in ticket checking activities and for trying the delinquents.

(Para 13.1.8)

### Chapter III

#### Interference With Running of Trains

28. Ticket checking activities should be combined with checks on other unauthorised activities, including alarm chain pulling and disconnecting hose-pipes.

(Paras 5.1 and 5.2)

29. The Railways should set up an organisation for massive checks in consultation with the States. A

minimum of ten to twelve Companies should be constituted for 24 calendar months—five for North Eastern, three for Northern, two for Eastern and two for Central Railways.

(Para 5.3)

30. RPF staff should be given training, which is extended to a normal police force, to deal with riotous assemblies.

(Para 5.3.1)

31. Special squads should be created for ticket checking and alarm chain pulling under a senior scale Commercial Officer. They should have 50 TTEs.

(Para 5.3.2)

32. One attendant should be exclusively earmarked for one coach. The existing orders of the Railway Board for providing only one attendant to look after two sleeper coaches should be withdrawn.

(Para 5.3.3)

33. There should be direct recruitment of TTEs. The channel of promotion of ticket collectors should be revised so that the chances of promotion of existing personnel are not affected.

(Para 5.5)

34. The existing laws should be amended and in case of conviction should provide the following punishments :

First offence —A minimum fine of Rs. 250 and a maximum fine of Rs. 1,000.

Second subsequent offences. —A minimum fine of Rs. 500 or an imprisonment for three months or both and a maximum of Rs. 1,000 or an imprisonment of six months or both.

(Para 5.8)

35. Senior Divisional Commercial Superintendents should be given a fund for suitably rewarding persons, who give valuable information regarding interferences. The expenditure from this fund should not be subject to any audit or accounts check.

(Para 5.11)

36. The design of the coaches should be changed so that no passenger in a train can manipulate the alarm chain apparatus. Such coaches should be used in vulnerable areas preferentially.

(Para 5.12)

37. Alongwith the introduction of air brake, an automatic recorder should be provided to indicate the number and time of occurrence for subsequent scrutiny.

(Para 5.13)

38. The State Governments should adopt a uniform procedure for vesting Railway Magistrates with judicial-cum-executive powers. They should form part of a regular cadre.

(Paras 5.14 and 5.15)

39. The practice of re-employing retired officers as Railway Magistrates should be given up.

(Para 5.15)

40. The State Governments should arrange the deployment to the Railways of fresh and young officers as Magistrates.

(Para 5.15)



41. The Railways must make their own efforts to redress the genuine grievances of the travelling public, which results in the pulling of alarm chains.

(Para 5.16)

42. Use of a large number of ministerial staff, who are available with the Railways, as volunteers for ticket checking activities, is recommended on a fixed honorarium.

(Para 5.17)

43. Ticket checking staff should be extended an incentive of graded honorarium provided a minimum target laid down by the railway administration is achieved every month.

(Para 5.18)

44. While blanking off the alarm chain apparatus in vulnerable areas, the only exception should be the ladies compartment.

(Para 5.19)

45. To effectively tackle the problem of disconnecting of hose-pipes, an expert Group of Railway Officers should be appointed to suggest measures, which would make such disconnection a difficult proposition, at the same time, maintaining the desired flexibility of Railway operation.

(Para 5.21)

#### Chapter IV

##### Thefts, Pilferages, Arson and Dacoities

46. A mobile outpost manned by the Civil Police should be established in running trains by changing the design of the SLR and providing a small but independent compartment in the area now provided for passengers. The SLRs should also be vested.

(Para 2.3)

47. The mobile outpost should register FIRs, irrespective of jurisdiction and the knowledge of precise place of occurrence.

(Para 2.5)

48. The mobile post should be provided with wireless sets to facilitate immediate investigation and giving of assistance.

(Para 2.8 to 2.10)

49. After the jurisdiction has been determined, the cases should be transferred to appropriate thanas.

(Para 2.11)

50. The current practice of providing escorts from the RPF should be abolished and this job handed over to the Civil Police for which purpose adequate manpower should be provided.

(Para 3.2)

51. The mobile posts should be manned by a posse of Policemen headed by a Sub-Inspector or an Assistant Sub-Inspector.

(Para 3.2)

52. The future production of SLRs should provide for an independent police outpost with ancillary facilities. For the time being, the mobile posts should be established in the existing SLRs.

(Para 3.2)

53. The escorting should be organised as per the following phases :

1. All Mail and Express trains in vulnerable areas during the night time.
2. After meeting (1) above, all Mail and Express trains in certain vulnerable areas running during day time also.
3. After meeting (2), the remaining passenger trains should be covered.

(Para 3.6)

54. In respect of thefts, the information compiled by the user department should be adopted as the official statistics.

(Para 4.3)

55. The Commercial Officers should be enjoined to inform the RPF of all cases, where prima facie evidence points to a theft. Such cases should be invariably registered by the RPF and included in the statistics.

(Para 4.7)

56. The Claims Prevention Cells should also include RPF officers.

(Para 4.8)

57. These Cells should enlarge their activities in the collection of commercial intelligence in respect of claims.

(Para 4.9)

58. Staff responsibility on commercial staff in claims cases should be fixed by the Claims Officers and not by the Divisional Officers. Only appeals in such cases should lie to the DRMs. For RPF staff, the penalties for cases of omission and commission should be made more deterrent. The minimum punishment in cases involving moral turpitude should be dismissal.

(Para 4.10)

59. RPF should be made jointly responsible with commercial staff in case of missing packages from sealed wagons.

(Para 4.11)

#### Chapter V

##### Railway Protection Force

60. RPF Regulations should continue to provide for assisting the Traffic Department in checking ticketless travellers, etc. by appropriate statutory amendments.

(Para 2.2)

61. The role of RPF should be limited to the primary objective of protection of property; to the secondary objective-albeit in a limited way-of assisting the ticket checking, alarm chain pulling activities, etc. as required, and for gathering and providing intelligence.

(Para 2.4)

62. Annual confidential reports of Security Officers posted in the Divisions should also be written by the Divisional Railway Managers.

(Para 3.1)



63. In view of the interface of the RPF with the Commercial Department, the Commercial Officers should have some say in the functioning of the Force working for them.

(Para 3.3)

64. The Force should have two district departments of protection and crime. Both these departments should be under the Divisional Railway Manager and the General Manager like any other departments, but the protection wing should have no say in the investigation of crime.

(Para 3.4)

65. Certain recommendations of the Kripal Singh Committee pertaining to organisation matters, which are still under implementation, should not be pursued any further.

(Para 3.5)

66. The yardstick for assessing the manpower of RPF should be fixed quickly. This should cover the assistance to be extended to Commercial Officers, as envisaged earlier.

(Para 4.1)

67. The status of the Inspector General of RPF, who is ex-officio Director of the Railway Board and the Chief Security Officers in the Railways, may remain unchanged.

(Para 5.1)

68. The number of RPF officers in vulnerable area as in the field should be adequately strengthened as required.

(Para 5.1)

69. The creation of Class I cadre of Assistant Security Officers for the Railway Protection Force is not recommended.

(Para 5.3)

70. The posts should be filled by officers on deputation from the IPS.

(Para 5.3)

71. In order to ensure adequate availability of IPS officers, the requirement of the RPF should be added to the other requirements for recruitment.

(Para 5.3)

72. The building up of the quality of the cadre should be a gradual process, but a substantial number of directly recruited officers should be in the Force within the next 2-3 years.

(Para 5.4)

73. Twenty-five percent of the Inspectors should also come on short term deputation from the State Police.

(Para 5.4)

74. The minimum educational qualifications for Sub-Inspectors should be raised to a graduate degree and for Rakshaks to a matriculation certificate.

(Para 5.5)

75. Relaxation in the educational qualifications and physical standards should be prohibited, excepting possibly in the case of recruitment of sons/wards of officers and men of RPF, who die/suffer incapacitation in the discharge of their duties.

(Para 5.6)

76. For senior management posts, e.g. Chief Security Officer and above, normally IPS Officers should be considered.

(Para 6.2)

77. For IPS Officers, who come to the Railways, a general familiarisation course should be organised by Railway Staff College, Vadodara.

(Para 6.2)

78. For other officers, who are promoted to the middle management level of the RPF cadre, special courses should be organised at the National Police Academy for appropriate training.

(Para 6.2)

79. Special training for the existing large number of promotee officers should be arranged by organising a few courses of about three months' duration at the National Police Academy so as to cover all officers within the next two years.

(Para 6.3)

80. In the existing Training College at Lucknow and other Zonal institutions, a few experienced commercial officers should be posted as Instructors for imparting training in commercial procedures.

(Para 6.5)

81. Rules for coordination between RPF and GRP/Civil Police should be institutionalised.

(Para 7.4)

82. Regular meetings with GRP/Civil Police at various levels should be held according to a specified schedule.

(Para 7.4)

83. Provisions in the Regulations, both for GRP/Civil Police and RPF, should be made that these forces will come to each other's assistances, whenever called for.

(Para 7.4)

84. The powers and the terms of reference of the recently established State level Committees and District level Committees should be specified and enjoined to meet at regular intervals.

(Para 7.5)

85. The RPF should be given the required powers to conduct preliminary investigations in all crimes against railway property, by enactment of suitable legislation.

(Para 9.7)

86. The Intelligence Wing should be strengthened in terms of manpower, training and equipment.

(Para 10.1)

87. Intelligence posts should be treated as prize posts and should carry incentives.

(Para 10.2)

88. The existing Central Crime Bureau should be re-structured and should function as the 'Statistical Coordination Cell-for crime and interference'.

(Para 11.2)

89. This Cell should gather and maintain a comprehensive record of criminals operating on the Railway network and indulging in any kind of crime and should be under the IG RPF.

(Para 11.2)



90. The Cell should be equipped with modern computerised aids and should undertake the responsibility of ascertaining whether an offender has been previously convicted in a crime against the Railways, in which case enhanced punishment should be sought for from the courts, as permissible under the law.

(Para 11.4)

## CHAPTER VI

### GOVERNMENT RAILWAY POLICE

91. The strength of the GRP which has remained stagnant, requires to be increased substantially.

(Paras 2.0, 3.0, 3.6, 3.7 and 5.1)

92. Serious efforts should be made to achieve some adequacy by effecting substantial increase during the next three or four years.

(Para 5.1)

93. The Government Railway Police should be merged with the District Police.

(Paras 5.2 and 5.3)

94. Non-registration of crimes should be tackled by the following measures :

1. Manner of lodging FIRs should be simplified by having a set proforma.
2. Where a written account is given, it must be attached to the FIR.
3. The FIR form should be serially numbered.
4. Non-registration of crime should be dealt with severely.

(Para 6.5)

95. After the merger, for crimes committed on running trains, the Police Station receiving the first information whether stationery or mobile) should be enjoined to launch immediate proceedings for detection of culprits and gathering of evidence, irrespective of jurisdiction. Subsequently, the transfer to the appropriate Police Station, based on jurisdiction, should be arranged.

(Para 6.6)

96. An exclusive Cell in the State Criminal Investigating Department should be established for dealing with serious cases of railway crimes.

(Para 6.7)

97. The modalities of merger of the GRP with the District Police should be entrusted to an expert group for forthright implementation.

(Para 7.1)

98. The Railway Wing of the Civil Police should deal with the following :—

1. Maintenance of law and order in railway premises.
2. Control of crime both in static establishments and areas and on running trains.
3. Escorting of passenger trains and maintenance of mobile posts.

4. Aiding the Railways adequately in their checks for ticketless travel, alarm chain pulling, hosepipe disconnections and other interferences, even by forming special units or Companies for the purpose.

5. Investigation of crimes against passengers and property.

6. Prosecution of cases investigated.

7. Intelligence functions.

(Paras 8.2 and 8.3)

99. Great importance should be attached to deliberate and wilful cultivation of excellent relations by the Divisional Officers and the senior officers of the Railway with the officials of the District Police.

(Para 9.2)

100. Coordination meetings should be held periodically between GRP/Civil Police & RPF to facilitate coordination.

(Para 5.2)

101. State Police Regulations should provide for coming to the aid of Railways in all actions of interference which may result not only in breaches of peace but also where there is likelihood of breaches of law, quickly and in manner specified.

(Para 9.2)

102. Railway Officials should have an indirect say in the annual assessment reports of the Station House Officers of the Railway Thanas and should convey their assessment to the concerned SPs with a copy to DIGs.

(Para 9.4)

103. The coordination between Civil Police and Railways should be institutionalised by following action :

1. Each Railway Police Station should maintain a minute book in which requests and suggestions received from the Railway officials would be entered. This would be open to all railway officials.
2. The Minute book should be examined frequently by the Superior Officers and the District Police and Civil Administration to ensure that appropriate notice was being taken of these suggestions.
3. The Divisional Railway Managers during their inspection must also visit and look into the functioning of the thanas at the stations. Their reports should go not only to the different outposts visited, but also to the Superior Police/District Police Officers.
4. In the case of all serious law and order occurrences, a copy of the report prepared by the SHO will also be sent to the Divisional Railway Manager for his information and action, as necessary.

(Para 9.5)

104. Healthy conventions must be established to achieve coordination between Station House Officers and Station Masters/Station Superintendents.

(Para 9.6)



105. The location and size of thanas should be improved by being established in a prominent place wherever feasible, but without diluting the Railway's primary objective.

(Para 10.1)

106. When new buildings are constructed, standardised lay out with sufficient space for police thanas and lock-ups should be provided.

(Para 10.1)

107. The staff posted with the Railway Police should be properly housed and located in the proximity of the stations.

(Para 11.1)

108. The Railways should give land to the State Governments, as required, near the stations, so that the latter could undertake to build the quarters.

(Para 11.2)

109. The GRP thanas should invariably be provided with Railway Phones, P&T phones and wireless sets.

(Para 12.1 & 12.2)

110. Like U.P., the other State Governments should arrange to provide road transport to the Police personnel at railway thanas.

(Para 13.1)

111. The Railway Police should be equipped with modern arms, which are lighter to carry, but this should be decided in accordance with the policies framed for the entire force.

(Para 14.1)

112. The principle of sharing of cost of GRP by the Railways on the basis 50:50 should be given up and the cost of GRP borne by the States in entirety.

(Para 15.9)

113. The slums in and around stations or around tracks in major cities should be removed by stringent action by Railways and the State administrations.

(Para 16.1)

## Chapter vii

### Answerability To Parliament

114. The responsibility for answering<sup>r</sup>parliament questions relating to crime on railways, other than pilferage of railway property, should lie with the Ministry of Home Affairs.

(Para 3.8)

115. Questions pertaining to pilferage of 'Railway Property' should be answered by the Railways.

(Para 3.8)

Sd. Prof. Ravi J. Matthal

Sd. V.P. Sawhney

Sd. Russi Mody

Sd. M. Satyapal

Sd. Justice H.C.P. Tripathi

Sd. H.C. Sarin  
(Chairman)

Sd. Dr. S.K. Ray  
(Secretary)

14 March, 1983.

नमो भगवते वासुदेवाय





सत्यमेव जयते





सत्यमेव जयते

भारत सरकार Government of India  
रेल मंत्रालय Ministry of Railways



# REPORT

OF

## THE RAILWAY REFORMS COMMITTEE

Part VIII

RESEARCH AND DEVELOPMENT

APRIL, 1983





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## INTRODUCTION

Having covered many facets of formidable problems of the Railways in the preceding seven Parts of our Report already submitted to Government, we have not failed to observe that there is inadequate emphasis on Research and Development in the entire technology-spectrum of this vast network.

We accept that the Research, Designs and Standards Organisation, generally known as RDSO, set up in the late Fifties, has to a measure helped the Railways to assimilate and indigenise the technology imported in the Fifties and Sixties, particularly in the matter of rolling stock including locomotives. In the absence of an appropriate and progressive R and D atmosphere in the whole of the Railway system, this organisation has, however, made little or no advance even on the imported technology.

To what extent RDSO is responsible for this failure is a matter of polemics, but in our view the fault lies in many places including RDSO and the Railway Board.

The result has been that the Indian Railways are today running a system based preponderantly on an obsolescent and outdated technology. The entire gamut of technology on the Indian Railways has regrettably witnessed very little revolutionary transformation, not even to optimise productivity or economy in performance. Due to substantial obsolescence of equipment, improvement in efficiency has been a continuously uphill task. That the performance-reliability of rolling stock and other equipment has been inadequate has led to a frustrating situation over and over again.

In view of the heavy tasks ahead for them, the Railways can continue to accept the present situation only at great peril to their system. As projected in Part II of our Report, the volume of traffic that the Indian Railways will be called upon to carry by 2000 AD is estimated to increase to a level 2 and 2½ times of what is being handled now. Against such a perspective, it would be entirely wrong to rely upon today's outmoded locomotives, other rolling stock, operational techniques, signalling and telecommunication, and the permanent way to handle this quantum-jump in the volume of traffic with any competence. They will have to modernise their equipment and rationalise their systems extensively, and soon.

The very magnitude of the system is a clear pointer to the fact that in the long term no modernisation-effort can be sustained by dependence on imported technology. To import technology at international prices is not only expensive, imposing a drain on our difficult exchange counter; such a process also takes time for local adaptation and is not always the most suitable for adequately meeting our requirements.

The Railways will, therefore, have to strengthen their base of research and development with a view to keeping themselves not only abreast, but also ahead of the developments taking place in railway technology elsewhere in the world, and this is not an impossible task. However, to achieve this objective, they will have to intensively take up research and development projects both of short and long-term perspectives. For the former, facilities can be built around the nucleus already available with

them in the shape of RDSO. For the latter, we have recommended setting up of separate specialised Research Centres for advanced technology.

While examining the functioning of RDSO, we have come face to face with certain obvious but serious deficiencies in the organisation. The laboratory facilities at RDSO are not only inadequate but also obsolete and antiquated. It is difficult to believe that there have been 20 Directors General at the head of the organisation within a period of 23 years, and of them only one was in position for about five and a half years, making the average stay of the others a poor eleven calendar months each. It was no mean surprise to us to find that the overwhelming proportion of the technical employees of the organisation had no technical education and had no real qualification for R and D work. One could hardly expect RDSO to deliver the goods under these circumstances, and it is our conclusion that they have not.

If RDSO has to serve the objectives for which it was set up, it will have to build up a cadre of highly qualified and dedicated research and development scientists. We have made several specific suggestions in Chapter IV of this Report on the subject. The laboratory, library and documentation facilities will need to be considerably upgraded. Our recommendations in this regard are contained in Chapter VI.

In the same chapter we have delineated certain essential and productive areas of research, and have in this context recommended a number of R and D projects which should be undertaken by RDSO with a view to increasing the productivity of assets and manpower of the entire railway network. These projects should also help in improving the performance-reliability of equipment, ensuring a higher standard of safety in rail transport and improving the quality of service to the public.

The Research Centres, as recommended by us, are meant for developing advanced generations of rolling stock and other equipment. Development of advanced generation of such equipment is necessarily a long-lead process, often spread over periods of 5 to 15 years even in the developed countries, and we have, therefore, considered it necessary to separate this task from RDSO which would have a predominant role in solving the problems of railway operations and R and D requirements of short-term nature. Our recommendations in regard to the role and structure of the Research Centres are contained in Chapter VII.

We have deliberately given our Report on Research and Development comparatively early in the formulation and submission of the different Parts of our Final Report. This is because we consider, having submitted the crucial technical Reports, viz. Parts II (Transportation), III (Railway Track, Bridges and Lands), and V (Production and Maintenance of Rolling Stock), that the neglect to the requirements of research and development would lead only to dereliction of the system.

We place great store on a complete overhauling of the R and D atmosphere on the Railways and our recommendations are outlined in the perspective of such an appreciation.





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## CHAPTER I

### OVERVIEW

#### 1.0. Introduction\*

1.1. Induction of Railways in India was spear headed by private British Companies. The first 32 Km rail line was opened on 16 April, 1853 between Bombay and Thane, by the GIP\*\* Railway Company. In the few decades that followed, several such Railway Companies came into existence, each with its own management. Each Company planned and developed its system to suit the particular needs of its terrain, traffic requirements, and its contacts and linkages back 'home', resulting in the acquisition for the country of a wide variety of locomotives, carriages, wagons and other equipment.

1.2. As the railways expanded, lack of coordination and standardisation of locomotives, carriages, wagons and other equipment created problems of interchangeability, repairs and efficient running of trains between the different systems. The Indian Railways Conference Association (IRCA) was, therefore, set up in 1903 with view to achieve coordination and uniformity of standards amongst the different systems.

1.3. By 1924, nearly half of the route kilometrage had come under Government control. By about the same time, IRCA also set up a number of 'Standards Committees' to assist in evolving uniformity of standards for the railway equipment in use. The first such Committee viz., the Locomotive Standards Committee, was formed in 1924. This was followed by the Carriage and Wagons Standards Committee, Track Standards Committee, Bridge Standards Committee, Signalling and Interlocking Standard Committee, Stores Standards and Specifications Committee and the Electrical Standards Committee. The first set of 46 IRS† specifications was issued in 1928.

1.4. Subsequently in 1930, an organisation known as the Central Standards Office (CSO) was set up with the objective of standardising designs and specifications in respect of materials, equipment, rolling stock, structures etc. commonly used in the Railways. The various Standards Committees also came under the purview of CSO. Upto this time most of the railway equipment, designs, specifications etc. were being procured through Messrs Randel Palmer & Tritton of UK, who, however, continued to be technical consultants to the Indian Railways.

1.5. CSO initiated some research in 1931 with the procurement of a dynamometer car for collecting data on locomotive performance. In 1935 studies for determination of track stresses, permissible axle loads, permissible speeds for different types of rolling stock and their impact on track and bridges were commenced.

1.6. In 1937, the Wedgwood Committee recommended for consideration : "Whether the scope of the Research Organisation might not with advantage be extended to cover practical experiments on a wider scale

than hitherto, in particular with reference to the trial of new materials and methods under ordinary railway working conditions".

1.7. The Pacific Locomotive Committee, in their Report in 1939, drew attention to the importance of research on the Railways and stated : "The value of such an organisation to an undertaking of the size of Indian Railways would be incalculable". This Committee further suggested that : "We feel that progress is hampered by an organisation inadequate to deal with the many problems which affect safety, comfort and economy and which require careful investigation, testing and analysis. No undertaking of the size of the Indian Railways can afford to be without a proper organisational and active research section fitted to give authoritative opinions on these matters".

1.8. However, even the limited research activities which were being undertaken by the Railways were suspended during the Second World War, when the exigencies of the war efforts made everything else redundant.

1.9. The Indian Railways Enquiry Committee (1947) drew attention of the Government to the importance of research and stated : "From our knowledge and observation of the work of the Indian Railways, we can confidently state that a vast field of research lies entirely unexplored and that investigations wisely directed and effectively controlled would provide solutions to railway problem which would result in increased efficiency and large economies". This Committee accordingly recommended : "In view of the extreme importance and indeed urgency of this problem we consider that plans for the development of the organisation should be taken a step further and that definite decision should be reached in regard to the setting up of the organisation, the extent and the quality of staff to be recruited, the nature and type of the building and equipment required. The Board should take energetic action to implement any decisions that may be arrived at".

1.10. With the passage of time, the railway system in India expanded considerably, Indigenous industries also prospered and reduced the import of equipment. In 1952, an organisation known as the Railway Testing and Research Centre (RTRC) was established at Lucknow for undertaking applied research, testing prototypes of rail equipment for their performance characteristics and investigation of problems, with a view to attaining self-sufficiency in respect of consultancy services which were still being procured from abroad. Whereas CSO continued to perform the functions of standardisation of designs and specifications etc., RTRC undertook the testing of prototypes and furnished the precise criteria and parameters for evaluation of the designs. With the setting up of these facilities, it soon became possible to dispense with foreign consultancy, and the contract with Randel Palmer & Tritton was terminated in 1955.

\* The scope of this Report is restricted only to R and D as applicable to technology. R and D aspect of management systems would be dealt with in separate reports on 'Organisation' and

'Management Information System'.  
\*\* Great Indian Peninsula.  
† Indian Railway Standard.



## 2.0. Birth of RDSO

2.1. With the launching of the Five Year Plans, an upsurge of industrial and other developmental activities led to increasing demand for rail transport. The Railways faced the challenge of meeting the accreting transport demand, inter alia, by progressive introduction of diesel and electric traction, by building new types of rolling stock and by a gradual switch-over to modern sophisticated systems of signalling on selected heavy-density routes. For doing all this, the Railways had to go in for import of technology. It was realized at this juncture that if the Railways in India had to meet the challenge of the future, they would have to keep themselves abreast of the technological developments which were taking place on the railway systems abroad.

2.2. Consequently, consultations were held by the Railway Board with the Council of Scientific and Industrial Research (CSIR) for setting up an organisation for achieving self-sufficiency in railway technology. At this point, Sir Harold Hartley, an eminent scientist who had occupied a Research Chair at the Oxford University and who had also helped the British Railways to set up what later became the well-known Railway Research Centre at Derby, happened to visit India. Advantage was taken to hold detailed discussions with him for starting a similar research centre in India.

2.3. As a result of these discussions, it was decided in 1957 to merge CSO and RTRC. The present organisation known as the Research Designs and Standards Organisation (RDSO) came into existence with headquarters at Lucknow. It was decided that RDSO should be allowed to grow and function independent of CSIR, but in close liaison with the latter. At the same time it was envisaged that RDSO should also keep itself in constant touch with the manufacturers of rolling stock and other rail equipment both in India and abroad. RDSO was thus an attempt on the part of the Indian Railways to have an integrated organisation where technological and research work in various railway disciplines were to be brought together with the object of achieving maximum efficiency, economy and self-sufficiency in train operations by coordinating research and development endeavours.

## 3.0. Organisation of RDSO.

3.1. RDSO is a multi-disciplinary organisation and is headed by a Director-General, who is of the rank of General Manager of a Zonal Railway. He is assisted by 12 Directors who are in charge of the following disciplines :

1. Architecture
2. Carriage (Passenger and other coaching stock, Electric Multiple Unit, Diesel Railcars and Containers).
3. Civil Engineering (Permanent way, Bridges & Structures).
4. Electrical Engineering (Electric rolling stock, locomotives and EMUs, train lighting, air-conditioning and general electrical engineering).
5. Engine Development\* (Development of diesel engines).
6. Metallurgical and Chemical Engineering.

7. Motive Power (Steam locos, diesel locos and cranes).
8. Wagon (Design, Consultancy and Inspection).
9. Signalling and Telecommunication.
10. Research (Permanent way, Bridges & Structures and Rolling Stock).
11. Traction Installation.
12. Traffic Research.

3.2. For managing certain ancillary functions the Director-General is assisted by a Senior Deputy Director-General who controls administration, personnel, stores and maintenance organisation and a Joint Director, Finance, who is in charge of finance and accounts functions.

3.3. Some of the Directorates in RDSO have Standing Advisory Committees (SAC) to assist in identifying projects for study and investigation. These Committees consist of the concerned Directors from the Railway Board as well as from RDSO. Besides, various Standards Committees, which were initially set up by IRCA, also continue to function and assist RDSO in its design and standardisation activities. These Committees have as their members, the heads of the respective disciplines of each of the Zonal Railways, with the RDSO functioning as the Secretariat so that the benefit of service experience is made available to this organisation. The following Standards Committees are currently functioning, pertaining to various disciplines :

1. Track Standards Committee.
2. Bridges & Structures Standards Committee.
3. Locomotives Standards Committee.
4. Carriage & Wagon Standards Committee.
5. Signal Standards Committee.
6. Telecommunications Standards Committee.
7. Electrical Standards Committee.
8. Joint Traction Standards Committee.
9. Indian Railways Chemists & Metallurgists Standards Committee.
10. Standing Corrosions Committee.
11. Water Treatment Committee.

## 4.0. Central Board of Railway Research (CBRR).

4.1. At the apex is the Central Board of Railway Research (CBRR), which advises the Railway Board on the research and investigation projects to be undertaken by RDSO. CBRR is headed by Chairman, Railway Board (CRB) and includes Members of the Railway Board, Director-General of RDSO, in addition to scientists, technologists, managers and senior executives drawn from other research organisations, universities and industries. CBRR meets only once a year and is expected to provide guide-lines for planning the research and developmental activities. CBRR has further set up Sub-Committees on Civil Engineering, Electrical and Mechanical Engineering, Metallurgical and Chemical

\* This Directorate was sanctioned recently and is still in the process of being set up.



Engineering, and Signalling and Telecommunication Engineering, to review progress of work in these disciplines in RDSO.

4.2. CBRR was expected to produce greater efficiency in railway research by allocation of priorities for research problems, by coordination with other Research Institutes to avoid duplication of efforts and to benefit by their work and finally to bring the knowledge of the highest body of available research workers to bear on the solution of the urgent railway problems. The composition of the present CBRR is given in Annexure A.1.1. (page)

## 5.0. Functions of RDSO.

5.1. RDSO has been assigned the role of adviser and consultant to Railway Board, Zonal Railways, Production Units and other railway users on technical matters. The main function of RDSO is to develop new and improved equipment and systems for the Indian Railways with a view to achieve maximum efficiency, safety and economy in their performance. In discharging this primary functions, RDSO has also taken up many subsidiary activities.

5.2. The principal areas of activity of RDSO are discussed in the following paragraphs :

1. *Research.*—The research activities of RDSO are primarily of an 'applied' nature. The objective is to find solutions to problems related to design and standardisation of equipment, repairs and maintenance practices etc. with a view to continuously improve the performance of the Railways. Such applied research is undertaken in all disciplines of the Railways. These cover locomotives, carriages, wagons, track, bridges, signalling and telecommunication, transportation etc. The research functions of RDSO are thus complementary to its activities concerned with design and standardisation of equipment and systems.
2. *Design and standardisation.*—The entire spectrum of research activity is ultimately geared to the development of designs of equipment which are efficient, reliable and economic. Once developed, these designs are standardised: the standards consist of drawings and specifications which are the documents used for bulk manufacture of equipment. RDSO has been given the responsibility of preparing standard designs and specifications for all rail equipment. RDSO also represents the Indian Railways on various Committees constituted by the Indian Standards Institute (ISI).
3. *Technical advice.*—RDSO is the consultant to the Railway Board, Zonal Railways, Production Units and other railway users and renders technical advice to them on a regular basis. It also has the responsibility of giving advice on the development of long-term plans, procurement of railway equipment and matters relevant to safety.
4. *Service/maintenance engineering.*—Investigating the 'in-service' behaviour of capital assets with a view to providing technical guidelines necessary for their efficient maintenance and improved performance.
5. *Import substitution.*—Development of substitutes for imported equipment and assisting local industries to build up indigenisation capacity.

6. *Inspection.*—Conducting inspections for all items of developmental stores. Providing inspection services not only for coaches and locomotives being manufactured by Railways' Production Units, but also for wagons produced by industry.

5.3. As to the quality of RDSO's performance in these different aspects of work, we would do in-depth scrutiny and analysis in subsequent chapters of this Report.

## 6.0. Conclusions.

6.1. The early years of development of Railways in India witnessed the introduction of a wide variety of locomotives, carriages, wagons and other equipment. Faced with the complex problems of maintaining and operating these diverse types of equipment, the Indian Railways set up the Indian Railway Conference Association (IRCA) and later the Central Standards Office (CSO) to achieve a degree of standardisation in the procurement of equipment. Subsequently, another organisation known as the Railway Testing and Research Centre (RTRC) was created to provide testing and consultancy services.

6.2. Later, CSO and RTRC were merged and RDSO came into existence. The objective behind setting up RDSO was to eliminate the dependence on foreign consultants and achieve large self-reliance in railway technology.

6.3. With the passage of time, RDSO developed into a multi-disciplinary organisation and was assigned the task of conducting applied research in all facts of railway working, standardising designs of equipment and rendering technical advice on various problems connected with the operation of the Railways.

*Annexure A.N.  
(of Para 4.2)*

## Composition of the current CBRR

### Chairman

1. Chairman,  
Railway Board,  
New Delhi.

### Members from Railways

2. Financial Commissioner,  
Railway Board,  
New Delhi.
3. Member Engineering,  
Railway Board,  
New Delhi.
4. Member Mechanical,  
Railway Board,  
New Delhi.
5. Member Staff,  
Railway Board,  
New Delhi.
6. Director General,  
Research Designs & Standards Organisation,  
Lucknow.
7. Director Research,  
Member Secretary,  
Research Designs & Standards Organisation,  
Lucknow.



*Other organisations*

8. Chief Controller (R&D),  
Ministry of Defence,  
New Delhi.
9. Chairman,  
Central Water Commission,  
New Delhi.
10. Director,  
Indian Institute of Technology,  
New Delhi.
11. Director,  
Indian Institute of Technology,  
Kanpur.
12. Deputy Director General (Engg.)  
Technical Development,  
Ministry of Industries,  
New Delhi.
13. Director General,  
Indian Standards Institution,  
New Delhi.
14. Vice Chancellor,  
University of Roorkee,  
Roorkee.
15. Director,  
Institute of Technology,  
Benaras Hindu University,  
Benaras.
16. Director General,  
Council of Scientific & Industrial Research,  
New Delhi.

17. President,  
Institution of Engineers (India),  
Calcutta.
18. Director,  
Bhabha Atomic Energy Research Centre,  
Bombay.

*Industry*

19. Chairman & Managing Director,  
Bharat Heavy Electricals Limited,  
New Delhi.
20. Chairman,  
Rail India Technical & Economics Services Ltd.,  
New Delhi.
21. Chairman,  
Steel Authority of India Limited,  
New Delhi.
22. Chairman & Managing Director,  
Electronics Corporations of India Limited,  
Hydreabad.

*Retired Railway Officers*

23. Shri Jagjit Singh,  
Ex-General Manager of SE Railway,  
New Delhi.
24. Shri R.M. Sambamoorthy,  
Ex-General Manager of S. Railway,  
Madras.

*Notes.*— 1. The last meeting of CBRR was held on 16 August 1982.  
2. Members at serial Nos. 17, 18, 21 & 22 did not attend this meeting.  
3. Members at serial Nos. 9, 10 & 16 were not present in person in this meeting.



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## CHAPTER II

### RDSO : AN APPRAISAL

#### 1.0. Introduction.

1.1. RDSO has a rather mixed record of performance. In certain areas its performance has been laudable. In many others it has not only made no mark but the steps taken have been only tentative. Very often it has only moved along the beaten track, and not exhibited the quest and enterprise of a research organisation.

1.2. Activity-wise our frank appraisal is set out in the subsequent paragraphs.

#### 2.0. Research.

2.1. Achievements of RDSO in the field of research have been next to nothing. What it has been doing has not been further development in technology but mainly adaptation and modification of imported technology to suit Indian conditions. No modern indigenous technology worth the name in any discipline has been developed by it so far.

2.2. For instance, the Wanchoo Accidents Enquiry Committee (1969) had recommended that research and development should be undertaken by the Railways for developing a self-propelled ultrasonic rail flaw-detection car for testing of rails. RDSO failed to develop such a car even after a lapse of about 14 years. To ensure that safety track does not get adversely affected on this account, we had to recommend the import\* of 9 ultrasonic rail flaw-detection cars, one for each Zonal Railway.

2.3. Another example is the failure of RDSO to develop a reliable and sturdy speedometer which could be used for locos in almost as many years. It was brought in evidence before the Wanchoo Accidents Enquiry Committee (1969) that the VDO type mechanical speedometer in use in the locos was not suitable as it was sluggish, did not show the speeds correctly, especially in the lower ranges, and frequently went out of order. The Wanchoo Committee had accordingly recommended that urgent steps should be initiated by the Railways to evolve a suitable type of speedometer-cum-speed recorder for use in locomotives. This recommendation was also reiterated by the Sikri Accidents Enquiry Committee in 1980. So far RDSO has failed to develop a suitable speedometer-cum-speed recorder locomotives.

2.4. RDSO's achievements in the field of updating or uprating imported technology have also not been satisfactory. Though diesel locomotives are being manufactured indigenously, the design of these locos has not progressed beyond what was purchased from ALCO\*\* in the early Sixties. Similar is the case with electric locos. The coaches currently being turned out by ICF or other indigenous factories also basically follow designs imported over two decades ago.

2.5. **Traffic research.**—In the field of transportation research also, nothing worth the name has been done. A miniscule Directorate has been set up to give only lip-service to traffic research, which is a very vital and central area of research in progressive Railways abroad. As a result, the techniques of train operations have continued to remain out-moded in many areas, resulting in poor utilisation of rolling stock and other costly assets. No worthwhile research has been undertaken in problems such as how to improve the average speed of goods trains, reduce detention in terminals and marshalling yards, what should be the optimum mix for the speeds of passenger and goods trains on the trunk routes etc.

#### 3.0. Design and Standardisation.

3.1. **Design.**—In the field of design, standard of performance has varied from one discipline to another. There are two aspects to the design of hardware : (i) design of components and sub-systems, and (ii) design of complete systems i.e. blending the various components and sub-systems into a desired whole system. Design development of components and sub-systems in developed countries is largely done by Industry. Research and Development on their Railways is limited to system designs. In India, however, very little component or sub-system designs in the area of railway technology is undertaken by Industry. This responsibility, therefore, also largely devolves on the Railways.

3.2. RDSO should encourage Railways Production Units and workshops to develop components and sub-systems. While on the one hand such a step would enable RDSO to supplement its efforts, it would on the other hand also help the Production Units and workshops to contribute in the development of component and sub-system designs.

3.3. Only in a few comparatively simple disciplines like the permanent way, RDSO has been able to develop some expertise. For instance, modern designs of prestressed concrete sleepers, elastic fastenings, ballastless track etc. have been evolved†. In most other disciplines, expertise for evolving new designs has either not been developed or is limited to some systems design only. For instance, in respect of motive power, carriage and wagon etc., little has so far been done in the area of component designs. Bulk of the design activity in these disciplines has been limited to systems only. A few instances of the new designs developed by RDSO are :

1. Electric loco, type WAP1, with 4,000 hp, having maximum permissible speed of 130 km/h ;
2. Electric loco, type WAM4B, capable of hauling 1600 tonne trailing loads on one-in-hundred gradient at 50 km/h ;

\* Cf. paragraph 4.13.1 of Part I of our Report.

\*\* American Locomotive Company.

† We have already recommended setting up of Development

Cells in the Production Units in paragraph 16.2 of Part V of our Report on Production and Maintenance of Rolling Stock.

‡ Their extensive usage even on the trunk routes has been restricted in view of limitation of resources.



3. Branch line diesel loco, type WDM 6, having 1400 hp ;
4. A wide variety of coaches such as day coaches, two-tier sleeper coaches, air-conditioned coaches, etc. ;
5. A large variety of wagons like BOX, BOXN, special purpose wagons for carrying acid, petroleum products, milk, etc.

All these are, however, only instances of system designs using components and sub-systems, which are primarily based on imported technology.

3.4. In the absence of adequate design capability in most of the disciplines, indigenous technological upgradation of the equipment in these areas has either stalled or has continued to be dependent on imported technology.

3.5. **Standardisation**—RDSO has rendered valuable service in standardisation of railway equipment. Standard specifications have been prepared and issued in respect of all the equipment commonly used in the Railways. In the earlier days of the Railways in India, a bewildering variety of locomotives, and other equipment were in use. For example, in 1923, 500 types\* of steam locomotives were in use. More or less similar was the situation in regard to track components, signalling gears and other equipment. Existence of such diverse equipment in each category created serious problems of maintenance. After CSO started functioning a sustained drive had to be undertaken for standardisation. As a result, there was drastic reduction in the wide variety of equipment being procured by the Railways. By the Sixties the number of standard designs for procurement of steam locomotives came down to only four in BG and two in MG. Standardisation of equipment led not only to better performance but eased maintenance and reduced cost of manufacture.

#### 4.0. Technical advice.

4.1. RDSO's role in rendering technical advice to the Railway Board, Zonal Railways, Production Units and other railway users has been useful. Whenever the Railway Board had to import new equipment like diesel or electric locos involving technology not available in the country, RDSO rendered valuable assistance in preparation of specifications and tender documents etc. and in carrying out technical evaluation on the various offers. RDSO has also successfully rendered in the past consultancy services to undertakings within the country connected with the design, manufacture, procurement and export of railway equipment. Notable amongst these have been the State Trading Corporation, the Projects and Equipment Corporation and a number of other private and public sector undertakings. We believe that so much has been RDSO's involvement in such activity that bulk of its work relates to investigation of the day to day problems referred to it by the Railway Board, Zonal Railways and the other railway users.

#### 5.0. Maintenance and Service Engineering.

5.1. In many areas of service and maintenance engineering, the performance of RDSO has not been entirely satisfactory. The performance reliability of

rolling stock and many other equipment has not been upto the mark. For instance, the average figure of laminated spring failures on the French and German Railways is 1.3 per cent whereas on the Indian Railways it is 8 per cent. Similarly, the number of diesel and electric loco (BG) failures per million engine kilometres on the Indian Railways during 1981-82 was as high as 12.4 and 16.8 respectively whereas failures of this nature are rare in countries such as Britain, France, Japan and Germany.

5.2. Another instance in this sphere is the problem of corrosion in coaches. During the course of our visits to various carriage workshops we had occasion to see extensive damage to the coaching stock due to corrosion not only in the vicinity of toilette rooms but all along the base of the side-panelling. The workload on this account appears to have gone up considerably in recent years necessitating the opening of special corrosion repair sections in many of the workshops. RDSO has, however, not so far been able to find a satisfactory solution to this problem. What is worse is that we did not find any evidence on the part of the Railways of any serious liaison or interaction with other national organisations also engaged in finding solutions to the problem of corrosion in their assets.

#### 6.0. Import substitution.

6.1. In the field of import substitution, RDSO's record has been creditable. The Indian Railways are the largest network of route kilometrage amongst the railway systems in developing countries. Of these they are easily the most self-reliant in respect of locomotives, carriages, wagons and other equipment. Excepting for a few components of rolling stock and certain highly sophisticated telecommunication equipment, the Indian Railways, by and large, do not depend on imports any longer.

6.2. Though manufacture of diesel and electric locos, integral coaches etc., was started by assembling imported components about two decades ago, production of such components has been rapidly and progressively indigenised. In 1981-82, the average import content in these locos and coaches has come down to below 10 per cent\*\*.

6.3. The proportionate cost of imported stores to total store purchases of the Indian Railways has also come down from 22.5 per cent during 1950-51 to 8.67 per cent during 1981-82. This is despite the fact that part of the requirement for some of the items like wheels and axles etc. has continued to be met through imports not because technology for their manufacture is not available within the country, but because of constraints in production capacity for these items. After production commences in the proposed Wheel & Axle Plant at Bangalore and the Diesel Components Works at Patiala, the proportion of the import content of the total purchases of the Indian Railways will drastically come down.

#### 7.0. Inspections.

7.1. RDSO has been providing inspection services in respect of locomotives, coaches (which are manufactured only at ICF), and wagons acquired for use by the Indian Railways. It has also, in the past, carried out inspections for the rolling stock procured by Industry in India, as well as by some of the Railway systems

\* Cf. paragraph 2.3 of Part V of our Report on "Production and Maintenance of Rolling Stock".

\*\* The objective should, however, be to achieve complete indigenisation.



abroad. Notable amongst the organisations which have availed themselves of these inspection services are Bharat Heavy Electricals Ltd., Fertilisers Corporation of India Ltd., Hindustan Steel Ltd., Indian Oil Corporation Ltd., National Coal Development Corporation Ltd., etc. within the country and the Egyptian, Malaysian, Yugoslav Railways abroad.

7.2. The inspection services by RDSO of these equipment were perhaps necessary in the past as adequate expertise or facilities in this field were not available with any other organisation in the country. With the coming into existence of the Rail India Technical and Economic Services Ltd. (RITES) there does not seem any further justification for continuing to saddle RDSO with this responsibility\*.

7.3. During the course of our visits to the Production Units of the Railways, we came across several instances where relaxations† in the specifications of certain components were permitted by RDSO. The impression which we formed was that the emphasis on quality assurance in the inspection services of RDSO has not been entirely satisfactory and certain relaxations were given in a cavalier fashion.

7.4. RDSO has also been maintaining liaison with the Industry engaged in the manufacture of equipment needed by the Railways. The objective of this liaison is to provide necessary guidance and technical assistance with a view to improving the quality and reliability of the railway equipment procured from them. Judging from the rather poor performance and reliability of a number of items of our equipment as compared to those of the foreign Railways (this was discussed in paragraph 5.1), it appears that this objective has also not been achieved.

#### 8.0. Technology advances in developed countries.

8.1. In the last two decades, the developed countries have made significant advances in rail technology. Some of the major achievements in comparison with the state of technology existing on the Indian Railways brought to our notice are as under :—

1. **Trailing loads.**—Freight trains over 1 mile (1.6 kms.) long with 10,000 tonnes plus trailing loads are running in Canada, USA, Australia, South Africa and Russia. Trailing loads on the Indian Railways are, however, still restricted to only 3,600 tonnes.
2. **Train speeds.\*\***—The following speeds have already been attained.
 

France	.. 380 km/h test speed 260 km/h operating speed
Japan	.. 260 km/h operating speed
Italy & Spain	.. 250 km/h test speed
Germany	.. 220 km/h test speed

Canada .. 200 km/h operating speed

The maximum speed on the Indian Railways is 130 km/h.

At the turn of the current century there was a difference of only 20 km/h between maximum speeds in India and those prevalent elsewhere. By 1933, however, U.K. had already run a steam-hauled train at 137 m.p.h. (220 km/h) test speed.

3. **Passenger comfort.**—High comfort‡ coache where accelerations are limited to 0.09† at speeds of 200 km/h are in use in Western countries. Indian Railways are, however accepting accelerations as high as 0.3 to 0.35 at much lower speeds of 100-130 km/h and this too for journeys of much longer durations.
4. **Freight systems.**—One-third of the two hundred thousand wagons on SNCF (French National Railways) are of special designs for bulk transportation of specific commodities. The Indian Railways have only just made a start in the concept of specially designed dedicated freight-stock.
5. **Locomotives.**—The heaviest electric locos on SNCF are of 7,900 hp. General Motors have recently put out a locomotive of 8,000 hp. against a maximum of 4,200 hp. on the Indian Railways.

Aeronautic type gas turbine engines combining power with light-weight are under development on SNCF. MAGLEV§ trains working on the principle of magnetic levitation—no contact with the rails—are under model testing in Japan for speeds upto 500 km/h.

6. **Reliability of systems.**—As discussed earlier, there is a wide gap in the area of system reliability also. Statistics of equipment performance show that despite significantly lower axle loads, speeds, trailing loads and horsepower, equipment failures, train delays, rolling stock ineffectives etc. are higher on the Indian Railways. A few instances are :

(i) Incidence of loco failures and hot boxes per million train kilometres is reported to be several times higher on the Indian Railways compared to the railway systems in the developed countries.

(ii) The average percentage@ of 'ineffectives' for diesel and electric locos is as high as 16.24 and 20.80 respectively on the Indian Railways. The corresponding figures for the Japanese Railways are 7.5 per cent and 6.0 per cent, for the French Railways 6.3 per cent and 5.8 per cent and for the German Federal Railways 6.4 per cent and 5.4 per cent.

\* We shall deal with this subject further in the next chapter.

† We have already suggested in paragraph 5.9 and 5.10 of Part V of our Report that the Railways should tighten the system of permitting relaxations.

\*\*Of. paragraph 8.3,

‡ The comfort standard depends on the 'ride index' of the coaches, which, inter alia, is a function of the accelerations experienced by a passenger in a moving coach.

†Acceleration due to gravity, which is equivalent to 981 cms./sec.<sup>2</sup>

§ 'MAGLEV' stands for magnetic levitation. It is a new concept in rail traction where magnetic forces are used for locomotion.

@The figures for the Indian Railways refer to the year 1981-82 whereas for the Japanese, French, and German Railways, for the year 1979-80. The authenticity of the figures for the Indian Railways is also not free from doubt.



(iii) Re-greasing schedule for roller-bearings is at intervals of 8 years on the advanced railway systems, whereas the Indian Railways are still trying to achieve a figure of four years.

(iv) Coaching-stock requires POH (periodic overhaul) after 5 years on the European railway systems and developmental efforts are now in hand to extend this period to 8 years. POH period for corresponding service in India is one year ;

8.2. The gaps between the equipment and systems in use on the Indian Railways and those of the developed countries are thus quite large. Many of these gaps may not be directly related to RDSO's failure ; but nevertheless they indicate the stage the 'state of art' in the field of railway technology achieved by the developed countries.

8.3. One can argue that the Railways in a developing country like India really do not need such advanced and sophisticated equipment and systems. This is indeed true in certain areas such as high speeds for passenger trains where the Indian Railways have, for want of adequate resources, given preference to increasing the traffic carrying capacity of the system rather than going in for high-speed trains.\* This argument cannot, however, hold for the performance characteristics, life of material, energy efficiency etc. which are almost more important in a developing country. The performance of RDSO has not been satisfactory even in these areas.

8.4. There are numerous reasons for this state of affairs: absence of manpower of requisite calibre, outdated and inadequate laboratory facilities, inadequate funds for R and D, faulty staffing policies for RDSO etc. Each such aspect will be dealt with in detail in the subsequent chapters.

## 9.0. Conclusions.

9.1. RDSO's performance has been one of mixed records. In certain areas such as standardising the designs of equipment, rendering technical advice to the Railway Board, Zonal Railways, Production Units and other railway users, indigenisation of the imported technology and import substitution, its achievements have been creditable. In the field of maintenance engineering, optimum utilisation of assets and inspection of equipment, its performance has not been upto the mark.

9.2. In the sphere of research and development towards modern technology or even uprating and updating of imported technology, RDSO's performance has been poor. The so-called 'Research Directorate' of the RDSO has merely been carrying out functions of testing of rolling stock for evaluating their speed and performance characteristics.

9.3. No research worth the name has been carried out by RDSO in the field of transportation, to which only a lip-service has been given by starting a miniscule Traffic Research Directorate.

9.4. In most of the disciplines the technology on the Indian Railways has been stagnating during the last two decades. As a result large gaps have appeared in the technology of the equipment and systems in use on the Indian Railways as compared to those of the advanced Railway systems.

9.5. Several deficiencies such as lack of modern laboratory facilities, absence of a cadre of highly qualified and dedicated R and D personnel and inadequate funds for R and D have been largely responsible for the poor performance of RDSO in keeping the Indian Railways abreast of the technological developments taking place elsewhere. If the Indian Railways have to meet the challenges of the future, these deficiencies will have to be rectified, and soon.

\* In order to narrow down the differential between the speeds of passenger carrying and freight trains, we have recommended in Part II of our Report that in respect of trunk routes Indian Railways should achieve 110 kilometres per hour of speeds for

passenger carrying trains and 100 kilometres per hour of speeds for passenger carrying trains and 100 kilometres per hour of speeds for freight trains.



## CHAPTER III

### TASKS AHEAD AND THE ROLE OF R AND D

#### 1.0. Introduction.

1.1. Although RDSO's efforts have helped the Indian Railways to be considerably self-reliant in equipment and their maintenance and operation, technologically many of these equipment are now obsolescent if not altogether obsolete. This is particularly so for diesel and electric locomotives, and signalling and telecommunication systems.

1.2. In the design of locomotives substantial progress has been achieved by developed countries, with a view to achieve fuel efficiency, higher performance and reduction in maintenance costs. These countries have also made use of the rapid advances in semiconductor technology, and have introduced thyristors to spark off a revolution in the field of control systems of Locomotives being produced in India, however, still continue to employ conventional control systems viz. tap changers for AC traction and rheostatic control for DC traction.

1.3. In the field of signalling and telecommunications, the advanced Railway systems have since graduated into the era of electronics and have adopted in their operations digital communication techniques, micro-processor based equipment and tools, radar controlled yard operations, computer net-working etc. The use of these techniques is leading to optimum utilisation of assets, higher efficiency, safety in operations and reduced cost of maintenance.

1.4. As already pointed out in the previous chapter, service-reliability of various equipment in use on the Indian Railways has been generally unsatisfactory. Up to a point, this is due to poor repair and maintenance. But the technological obsolescence of equipment and inadequacy of support from RDSO in service/maintenance engineering has also substantially contributed to this state of affairs. In the absence of adequate support from RDSO, practices and standards for repairs and maintenance in many areas have continued to be set at lower work-levels which are not equipped for the purpose Rectification of these deficiencies would call for necessary R and D inputs in the concerned areas.

#### 2.0. Traffic growth.

2.1. The growth in freight and passenger traffic on the Indian Railways during the last 30 years has been given in Table 3.1.

Table 3.1  
Growth of traffic

	1950-51	1960-61	1970-71	1980-81
1. Originating traffic (in million tonnes).	93	156.2	196.5	220.0
2. Net tonne Kms. (in millions).	44,117	87,680	127,358	158,474
3. No. of passengers (in millions).	1,284	1,594	2,431	3,613
4. Passenger Kms. (in millions).	66,517	77,665	118,120	208,558

\* Cf. paragraph 10.5 of Chapter I of Part II of our Report on 'Transportation'.

\*\* Cf. paragraph 5.3 and 6.8 of Chapter I of Part II of our Report on 'Transportation'.

2.2. In the coming decades, the Railways will witness a phenomenal growth in traffic. Projections made by us indicate that by 2000 AD, the freight and passenger traffic on the Indian Railways is expected to go up to 2 to 21 times of the present levels. The quantum of goods traffic to be carried would lie somewhere between 374 and 413 billion net tonne kilometres approximating to originating tonnage of between 585 and 664 million tonnes.\* In regard to passenger traffic, the suburban and non-suburban traffic by the turn of the century have been estimated to be of the order of 280 billion and 160 billion passenger kilometres respectively.\*\*

#### 3.0. Need for modern technology.

3.1. It would be an uphill task for the Railways to handle this quantum-jump in traffic. One thing is obvious : the Railways can no longer afford to depend on the existing outmoded locomotives, permanent way and signalling and telecommunication systems for handling this prolific increase in traffic. The only way is to modernise the railway equipment and systems with a view to achieving higher productivity from these costly assets. In this context it may be mentioned that some of the Railway systems abroad, notably the Russian Railways, have been able to achieve a very much higher utilisation of rolling stock and track during the last 15 or 20 years. This is indicated in Table 3.2.

Table 3.2

#### Utilisation of track and Rolling Stock

	Indian Rlys. (B.G.)	Russian Rlys*
Net tonne kms. per tonne wagon capacity per day.	50.3 (1981-82 status)	120 (1963 status)
Net tonne kms. per track km. per annum.	3.35 (1981-82 status)	14.6 (1970 status)

3.1.1. The need for modernisation of equipment and operational practices has thus become an inescapable necessity for the Indian Railways.

3.2. Continued use of equipment based on outmoded technology only leads to a stagnation in the productivity of manpower. For instance, although during the decade 1970-71 to 1980-81, the total investment on assets on the Indian Railways jumped from Rs. 4,099.4 crores to Rs. 7,448.4 crores (81.7 percent increase), the corresponding growth in the net tonne kilometres and passenger kilometres was from 127,358 to 158,474 (24.43 percent increase) and from 118,120 to 208,558 (76.56 percent increase) respectively. During the same period the manpower† on the Railways also increased from 13.74 to 15.72 lakh employees (14.4 percent increase).

† The figures could not be updated for want of availability of relevant statistics.

‡ Excluding casual labour.



For want of technology-upgradation, the productivity of manpower has been stagnating in some disciplines or even declining.

3.3. In the interest of financial viability of the system, the Indian Railways cannot go in for a massive augmentation of their manpower for handling the increase in traffic expected to materialise by 2000 AD. This can be controlled only by recourse to modernisation of equipment and operational practices, and by recruiting and training personnel to match the improvements in technology, as has been done by the developed countries.

3.4. An idea of the quantum of manpower employed by some of the Railways abroad to carry their traffic can be had from the statistics given in Table 3.3. This table shows that given the necessary technological inputs and the right working environment, it is

possible for the Indian Railways to handle several times the traffic which they carry now even with the existing manpower strength. This aspect assumes great significance in the context that manpower alone constituted 45.6 percent of the total working expenses for the Indian Railways during 1981-82.\*

3.5. A scrutiny of the table shows that vast potential exists for increasing the productivity of manpower on the Indian Railways.

3.6. The energy scenario that has emerged over the past decade makes increasing dependence on rail transport inevitable, as it is the most energy-efficient transport system for medium and long hauls. The National Transport Policy Committee (NTPC) has given the following statistics (Table 3.4) of energy consumption for passenger traffic for various transport modes :

Table 3.3  
Manpower vis-a-vis traffic carried

Name of the countries	Traffic Units (Millions)			Number of † employees	Number of employees per million traffic units
	Net tonne kms.	Passenger kms.	Total traffic units†		
1. Australian National Railways	56,182	2,924	56,389.60	68,123	1.21
2. Australian Federal Railways	11,301	8,643	11,914.65	75,389	6.33
3. Belgian National Railways	8,211	6,963	8,705.37	65,652	7.54
4. Chinese National Railways	570,732	138,037	580,532.62	1,535,400	2.64
5. Czechoslovak State Railways	68,210	18,043	67,491.05	176,177	2.61
6. Canadian National Railways	67,655	487	67,689.58	8,707	0.13
7. Danish State Railways	17,040	3,731	17,304.90	21,200	1.23
8. French National Railways	70,908	54,251	74,759.82	254,400	3.40
9. German State Railways	56,416	23,142	58,059.08	237,947	4.10
10. German Federal Railways	65,880	47,690	69,265.99	328,980	4.75
11. Hungarian State Railways	24,430	11,337	25,234.93	136,247	5.40
12. Japanese National Railways	42,975	197,682	57,010.42	420,815	7.38
13. Spanish National Railways	10,887	13,527	11,847.42	71,547	6.04
14. Swedish State Railways	15,953	6,787	16,434.88	37,544	2.28
15. Swiss Federal Railways	7,524	9,179	8,175.71	38,367	4.69
16. Soviet Railways	3,350,800	332,100	3,373,579.10	2,031,200	0.60
17. Yugoslav Railways	25,018	10,594	25,770.17	142,928	5.55
18. Indian Railways	155,995	198,642	170,098.58	1,550,360	9.11

Table 3.4  
Energy consumption for passenger traffic

Mode	Energy consumption	
	Propulsion purposes	Non-propulsion purposes
	BTU/Pass. Km.	BTU/Pass. Km.
Electric traction (Rlys.)	54.6	10.0
Diesel traction (Rlys.)	151.2	9.0
Diesel bus	288.7	29.0
Petrol bus	526.5	29.0

3.7. In regard to freight traffic, NTPC had concluded that generally for leads longer than 300 kms., transporta-

tion by Railways was more economical than by road vehicles. Keeping in view the large size of our country, and the long leads involved, the Railways are the most economical mode of transport. § On this consideration, modernisation of railway technology assumes added significance.

3.8. *Export.*—The Indian Railways have also taken some strides in the export of equipment and consultancy services to the developing countries. In a few countries, execution of projects on turn-key basis and complete management of the railway system have also been undertaken. Some of the countries where one or more of these services have been provided are : Algeria, Iran, Iraq, Jordan, Malaysia, Nigeria, Philippines, Sri Lanka, Syria, South Korea, Taiwan, Thailand and Zambia. In the case of Nigeria, the Rail India Technical and Economic Services (RITES) were given the responsibility of managing their Railway system for a period of three years.

\* These issues will be discussed in depth by the Committee in a later Report on 'Economics'.

† One Traffic Unit has been assumed to be equivalent to one Net tonne kilometre + 0.071 passenger kilometres.

‡ Figures relate to the year 1979-80.

Source : (i) International Railways Statistics 1980.

(ii) JANE'S World Railways 1980-81.

§ We have discussed these issues in great detail earlier in Part I of our Report on 'Transportation'.



3.9. During this period, the Indian management team was able to improve the performance to such an extent that its achievements were applauded not only in Nigeria, but by the international press also. In the case of Algeria and Iraq, the Indian Railway Construction Company (IRCON) are constructing new railway lines on turn-key basis. The latest in this series is the award of a contract to IRCON for modernisation of the railway workshops in Sri Lanka.

3.10. In the field of export of railway equipment mainly locos, coaches and wagons, starting from 1967-68, the aggregate exports have totalled about Rs. 130 crores by 1981-82.\* However, in the absence of technological upgradation, rail equipment and consultancy services gradually seem to be losing their competitiveness in the international market. Of late, even the developing countries have become intolerant of anything but the very latest in equipment and the concept of an appropriate intermediate technology has largely proved to be wishful thinking. For instance, a general speed capability 160 km/h on B.G. and 130 km/h on M.G. will have to be achieved for our coaches if their export has to survive. This only emphasises the need for modernisation of our equipment and operational and maintenance practices.

3.11. In this context, it may also be mentioned that international buyers like to be assured that the equipment or services which they are purchasing are of proven designs. To achieve this objective, it would be necessary for the Indian Railways not only to improve the speed potential and performance characteristics of their rolling stock, track etc., but also to earmark a separate stretch of track of about 300 kms. for regular operation of these equipment.

#### 4.0. Future role of RDSO.

4.1. RDSO, as already brought out by us, has so far not undertaken any significant research involving development of indigenous technology as distinct from adapting and modifying imported technology. The manpower and other infrastructural facilities required for development of indigenous modern technology also do not exist in RDSO.

4.2. In our view, in its present organisation and culture, it will not be possible for it to take up and meet the challenges of developing modern indigenous technology, even with some strengthening and improvement in this organisation. Besides, the strengthening of RDSO for carrying out the functions of development of advanced generations rolling stock and other equipment would make this organisation unwieldy and cumbersome for effective control and management. For this task, separate centres of advanced railway technology would need to be set up. We shall discuss this aspect in detail in Chapter VII.

4.3. So far as RDSO is concerned, its role needs to be clearly redefined as a sequel to this appreciation. Apart from relieving this organisation of the responsibility for development of advanced generations of equipment, it would also have to shed most of its inspection functions. We find that RDSO at present has been assigned the responsibility of undertaking inspections for not only the products from the Railways' own Production Units viz. Diesel Locomotive Works, Chittaranjan Locomotive Works and Integral Coach Factory, but also for the wagon manufactured by private/public-sector industry, in addition to all new items which are of developmental nature.

4.4. In the matter of inspection of wagons, a viewpoint was put forward before us that this enables the 'Wagon Directorate' of RDSO to look into the question of modification in wagon designs which sometimes becomes necessary due to constraints in the availability of materials of the right specifications. This, we feel, is still possible without the actual inspection function for wagons remaining with RDSO.

4.5. In our view, routine inspections of this nature only tend to dilute the emphasis on Research and Development. We, therefore, recommend that RDSO should be relieved of the function of inspection of wagons. The responsibility should be transferred to RITES, which is already carrying out inspections for a large number of equipment being procured by the Railways.

4.6. In regard to inspection of coaches and locomotives from the Railways' own Production Units, there is a need to review the existing arrangements. We note that in the case of coaches manufactured by the Bharat Earth Movers Ltd. (BEML) and Jessops, inspection has already been handed over to RITES. This process should be taken to its logical conclusion by phased handing over of inspection of coaches and locomotives also from the Railways' Production Units to RITES.

4.7. The residual functions of RDSO will thus comprise :

1. Applied research. This will exclude research for development of advanced generations of rolling stock and other equipment for which separate centres of advanced railway technology would need to be set up.
2. Design and standardisation.
3. Rendering technical advice.
4. Maintenance and service engineering.
5. Import substitution.

4.8. The above functions constitute a continuous and substantial workload for a large network like the Indian Railways. This type of workload would only grow with the growth of traffic on the Railway system. Even for performing these functions efficiently, RDSO would need considerable improvement in the quality and calibre of its manpower and suitable improvements in its organisation and procedures. Our recommendations on these issues are given in Chapters IV, V and VI.

#### 5.0. Conclusions.

5.1. The tasks ahead for the Indian Railways are formidable. They will be called upon to carry 2 to 2½ times the traffic which they are handling now. Due to financial constraints, it would not be possible to increase their assets and manpower on the present basis to any significant extent to handle the increased traffic. The only option is to modernise the existing rolling stock, other equipment and operational practices to achieve significant increases in the productivity of both assets and manpower.

5.2. The Railways are the most economical mode of transport for medium and long hauls for both passenger and freight traffic. In the context of the energy crunch, increasing dependence on rail

\* Cf. paragraph 1.2 of our Part V Report on 'Production and Maintenance of Rolling Stock'.

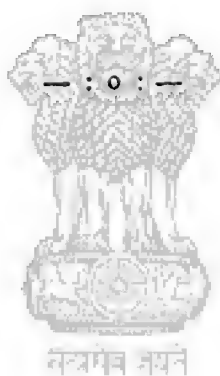


transport has become inevitable. To successfully perform this role, the Railways must speedily modernise themselves.

5.3. The Railways have made some strides in the field of export of equipment and consultancy expertise. A vast potential in this field, however, still lies untapped. The developing countries which import our rolling stock and consultancy services are now increasingly going in for the most modern equipment and services. It is another factor which makes it necessary to modernise our equipment and services. Otherwise, not only would we fail to tap the vast potential that lies ahead, but may be even elbowed out of the export market by the developed countries.

5.4. The role of RDSO needs to be redefined. Its future role should be restricted only to designs, standardisation, and applied research in different facets of the Railways operations, maintenance and service engineering and in import substitutions. Inspections which are not too complicated and which tend to dilute emphasis on R and D activities should be taken out of the purview of RDSO and handed over to RITES.

5.5. For development of advanced generations of rolling stock, and other equipment, neither has RDSO the requisite manpower nor the required equipment and facilities. For this purpose, separate centres of advanced railway technology should be set up.





## CHAPTER IV

### RDSO : MANPOWER

#### 1.0. Introduction.

1.1. The quality of research and development hinges primarily on the personnel deployed for this work. A high level of professional knowledge, an analytical mind, capacity and keen desire for creative thinking are some of the principal attributes needed for R and D work. Selection and grooming of personnel endowed with these attributes is no easy task. It is, therefore, essential that an enlightened and forward-looking policy is pursued in building up a team of R and D personnel of the requisite calibre. Expenditure incurred on the manpower for R and D should be viewed as an investment expected to pay rich dividends.

1.2. It is also necessary that the personnel engaged in R and D are provided with a working environment in which they are able to devote single-minded attention to their work. Their status and remuneration *vis-à-vis* their counterparts employed in field jobs should be commensurate with their academic qualifications, experience and their contribution to the growth and functioning of the Railways. They should continue in their assignments long enough to be able to successfully complete projects initiated by them or during their tenure.

1.3. We have later in this chapter dwelt upon each of these aspects and have given recommendations in regard to the manpower policy to be followed for RDSO. So far as the manpower for the proposed Research Centres of Advanced Railway Technology is concerned, we shall deal with it in Chapter VII.

#### 2.0. Existing policy.

2.1. At present, there are two channels for filling up posts in RDSO :

1. Personnel, recruited directly for RDSO, who stay permanently in this organisation.
2. Personnel drawn from the Railways to work in RDSO for fixed tenures.

2.2. The directly recruited personnel are mainly the non-gazetted employees of RDSO as also such of the junior officers who have been promoted to their jobs from this cadre. Almost all Senior Officers are drawn from the Railways. These Officers serve in RDSO for tenures ranging from three to five years, at the end of which they are replaced by fresh incumbents from the Railways.

#### 3.0. Existing manpower.

3.1. The details of the sanctioned-staff strength are tabulated in Annexure A 4.1. The summarised position is given in Table 4.1.

Table 4.1

Sanctioned strength of RDSO as on 1 January, 1983.

S. No.	Category	Technical Directorates.	General Administration.
1.	Group 'A' (Class I Officers)	222	11
2.	Group 'B' (Class II Officers)	126	16
3.	Group 'C' (Class III staff)	1,938	542
4.	Group 'D' (Class IV staff)	531	950
		2,817	1,519
		Grand Total—4,336	

3.2. *General Administration.*—It is seen that out of a total strength of 4,336 employees in RDSO, 1,519 i.e. about 35 per cent are engaged in General Administration work. Bulk of these employees neither perform any research and development functions nor assist in these functions even remotely; on the contrary they are mainly engaged in miscellaneous and ancillary jobs like maintenance of Offices, colonies, electric and S & T installations, watch and ward functions etc. In our view, presence on the roll of RDSO of such a large proportion of employees engaged only in miscellaneous jobs, which are not even distantly connected with R & D activities does not give rise to an atmosphere conducive to research. On the other hand, attending to the administrative and other problems of such a large body of staff only detracts attention from the primary research and development functions and serves as a drag on the R & D activities.

3.3. In fact, administration and maintenance activities seem to have become more important while research and development, to all intents and purposes, has taken the pillion seat in RDSO. We recommend that the ancillary activities like maintenance of offices and colonies, watch and ward functions etc. should be taken away from RDSO, and handed over to the Lucknow Division of the Northern Railway\*. This step would result in taking away from the roll of RDSO about 1,000 employees and, to that extent, would make this Organisation more compact, effective and research and development oriented. Besides, Lucknow Division, which has more resources at its disposal, would be able to maintain RDSO offices and colonies to a better

\* This would mean that only the control over the concerned staff would pass over to the Division, while the staff would have no

physical transfer and would continue on their present work.



standard. The present such resources with RDSO should be placed at the disposal of Lucknow Division of Northern Railway and the combined strength reviewed, if necessary.

3.4. **Technical Directorates.**—The responsibility for research and development functions devolves on the Technical Directorates. These Directorates employ both technical and non-technical employees. The break-up of the sanctioned strength in technical and non-technical categories is given in Table 4.2.

Table 4.2

## Sanctioned strength of Technical Directorates.

S. No.	Category	Technical employees	Non-technical employees
1.	Group 'A' (Class I Officers)	222	..
2.	Group 'B' (Class II Officers)	102	24
3.	Group 'C' (Class III staff)	1,671	267
4.	Group 'D' (Class IV staff)	..	531
	Total	1,995	822
Grand total—2,817			

3.5. We note that even in the Technical Directorates, out of a total sanctioned strength of 2,817 employees as many as 822 i.e. about 29 per cent, are non-technical employees, bulk of whom are Class IV staff. The Committee are unable to appreciate how such a large body of unskilled Class IV staff are employed in the Directorates engaged in R and D activities. Employment of such a large body of Class IV staff eats into the already insufficient funds allotted to RDSO and should be reduced.

3.6. So far as the technical employees actually engaged in research and development activities are concerned, Table 4.2 shows that over 80 per cent of them are non-gazetted employees who are supposed to support these activities in one way or another. These employees comprise Drawing Office staff like Tracers and Draftsmen and technicians like Laboratory Assistants, Research/Design/Technical Assistants. The various grades for these technical employees operated in RDSO, and the corresponding methods of recruitment and promotions for each of them are given in Annexure A. 4.2. It is seen from this annexure that the minimum qualification laid down for Research/Design/Technical Assistants is either a Diploma in Engineering with three years experience or a Degree in Engineering for direct recruits or three years experience as a Draftsman Grade 'A' for promotees. For Draftsmen and Tracers the minimum qualification is however, a Diploma in Draftsmanship while for a Laboratory Assistant it is Intermediate in Science for direct recruits and Matriculation with Science for promotees.

3.7. Past experience has shown that it is not possible to attract or retain Graduate Engineers in the non-gazetted jobs of Research/Design/Technical Assistants, as promotions to the gazetted posts are slow, with little avenues for further promotions. The present cadre of non-gazetted employees recruited directly for RDSO, therefore, has very few Graduates in Engineering. There are, in fact, quite a large number of employees in this cadre who have no technical qualifications 'at all' having been initially inducted as Tracers (when the minimum qualification for this job was Matriculation) or Laboratory Assistants, and later having risen up the ladder through departmental promotions. This situation is amply brought out by an analysis of the educational profile of RDSO's technical employees from the cadre of Tracers to that of Directors, which is given in Table 4.3.

Table 4.3

Qualifications of the technical employees	Percentage of the employees
1. Engineering Graduates	25*
2. Diploma in Engineering	20
3. Diploma in Draftsmanship	11
4. Without any technical qualifications	44

3.8. Due to their faulty recruitment and promotion policies, the Railways have landed themselves into a tricky and unwholesome situation in which as high as 44 per cent of the technical jobs in their only research and development institution are today manned by persons who do not possess any technical qualifications at all. The educational profile of RDSO's employees stands in sharp contrast to those of other research institutions abroad or even within the country. The latter institutions not only do not employ unqualified or ill-qualified personnel, but also usually have a sizeable portion of their employees with post-Graduate and Ph. D. qualifications. Evidently, the present composition of RDSO's employees is ill-suited for the role assigned to this Organisation. Urgent action, therefore, needs to be taken to remedy this situation with a view to ensure that all technical jobs are manned by persons possessing suitable technical qualifications.

3.9. Further, Research/Design/Technical Assistants, Laboratory Assistants, Draftsmen and Tracers at present constitute over 80 per cent of the total strength of the technical employees. This proportion, we consider, is unusually high. This is an anomalous situation in which the number of those who are actually engaged in the research and development activities is far out-weighted by those who assist these activities either directly like the Research/Design/Technical Assistants, or only remotely like the Laboratory Assistants, Draftsmen and Tracers. If RDSO has to effectively play the role assigned to it, this anomaly will have to be rectified by surrendering the lower level jobs manned by unqualified and ill-qualified persons, and replacing them with higher level jobs to be filled in by persons with high academic qualifications, better experience and proper aptitude.

\* This percentage also includes employees with Ph. D. and M. Tech./M.B./M. Sc. qualification to the extent of 0.4% and

4.5% respectively.



### 3.10. Action plan.

3.10.1. To achieve the above objective, we recommend the following action plan :

1. Modern research and development organisations no more rely upon the services of Draftsmen and Tracers for preparation of drawings or copies thereof. Instead these jobs are carried out more efficiently and with greater accuracy and speed by Engineers and Research/Design/Technical Assistants themselves with the help of computer-aided drafting machines for preparing drawings and reprographic equipment preparing copies thereof. We recommend that RDSO should also fall in line with this well-established and scientific practice. A beginning should be made by acquiring adequate number of reprographic machines for handling the job of preparing copies of drawings. Simultaneously, the posts of Tracers, who are doing this job, should be surrendered. In the long-run, the posts of Draftsmen should also be phased out by acquiring sufficient number of computer-aided drafting machines. These steps will enable RDSO to become a compact organisation consisting of only Technologists, Scientists and other Experts for performing research and development function and Technicians to assist in these functions.

The phasing out of Tracers and Draftsmen in the RDSO can be achieved by: (i) freezing all vacancies existing in these categories, and (ii) gradually transferring the existing incumbents to the Zonal Railways and Production Units. The new units that are coming up like the Diesel component Works, Patiala, the Wheel & Axle Plant, Bangalore etc. should be asked to absorb these categories from RDSO.

2. So far as the Research/Design/Technical Assistants are concerned, there also is need to upgrade their professional competence and knowledge. Rapid advances in the field of science and technology are taking place. It is considered that the minimum qualification of a Diploma in Engineering is not adequate for these Technicians. Whereas it may not be practicable to insist on the minimum qualification for recruitment of Research/Design/Technical Assistants to be raised to a Degree in Engineering, efforts should be made to attract as many Engineering Graduates to these jobs as possible. This would be possible only if the jobs of Research/Design Technical Assistants are made attractive by improving their promotional prospects. For achieving this objective, not only the present promotional prospects of Research/Design/Technical Assistants upto the level of Deputy Directors should be continued, but even higher posts to a small extent (say 10 per cent) should be filled from this category. It will, however, have to be ensured that the minimum academic qualification, i.e. a Degree in Engineering, for promotion to Assistant Research/Design Engineer or a higher post is not relaxed. If suitably qualified persons are not available in this cadre, the vacancies should be filled by transfer of properly qualified Personnel from the Railways.

3. So far as the Officers of the level of Deputy Directors and above are concerned, as already pointed out, almost all of them are presently drawn from the Railways. While this procedure provides an opportunity to induct well qualified Officers and Engineers with field experience, great care needs to be exercised in the selection of these Officers for posting to RDSO. The normal system of selection is by looking for Class I Officers with adequate experience in the field, and with a good record of service as reflected in the annual confidential reports. What is actually needed is not simply efficiency in administration, but an innate talent for research which involves skills such as conceptualisation of problems, imaginative thinking-out of possible solutions, scientific interpretation of results etc. Such an assessment can only be made after a detailed interview of the provisionally selected or interested candidates. It would, therefore, be more appropriate if the Directors of RDSO periodically go out on 'talent-scouting' trips to the Zonal Railways and the Production Units for selecting the Officers.

4. Research and development activities are also handicapped by the virtual absence in this Organisation of highly qualified experts in specialised areas such as computers, higher mathematics, statistics, vibrations, plastics, tribology, instrumentation etc. Research and development institutions in advanced countries employ these Specialists on a liberal scale. We recommend that RDSO should also induct such Specialists to give a boost to research and development activities. Depending upon the actual requirements, these Experts can be inducted either on a permanent basis or for fixed periods. In the latter case, they can also be drawn from the National Research Institutions, Academies, Universities etc.

#### 4.0. Separate cadre for RDSO.

4.1. As brought out earlier in this chapter, 80 per cent of Deputy Directors and almost all other Senior Officers of RDSO are drawn from the Railways for tenures ranging from 3 to 5 years. A viewpoint was expressed before the Committee that like other National Research Institutions, RDSO should also have a separate cadre of directly recruited Officers. It was argued that in the very nature of things research and development projects are long-lead projects, necessitating the stay of the Officers in the Organisation to develop the necessary expertise to take these projects to their successful completion. It was further stated that since Officers drawn from the Railways stay in RDSO only for limited periods, this objective can only be achieved by having a separate RDSO cadre of Officers.

4.2. The cadre structure of an organisation has to be in conformity with its objectives. The future role that we have assigned to RDSO involves functions like standardisation of designs, maintenance and service engineering, rendering advice on technical problems, besides applied research in various facets of Railway operations. For performing these functions efficiently, we consider field experience on the Railways essential. This experience gives to the Officer an exposure to the actual operational and maintenance problems encountered in the field and comes handy when, on getting posted to RDSO, he is called upon to find solutions to these very problems. We understand that research organisa-



organisations in developed countries like Japan, Germany, France, Britain etc. also draw bulk of their manpower from among serving Officers on their Railway systems. We agree with this practice, and recommend that the present policy of manning bulk of the senior posts in RDSO by the Railways' field officers should continue, without making any compromise on qualifications, experience and aptitude.

4.3. In regard to non-gazetted staff, we find that almost all of them are now recruited directly for RDSO and stay in this Organisation permanently. For reasons given in paragraph 4.2 above, we recommend that atleast 25 per cent of them should also be drawn from the Railways on tenure basis.

#### 5.0. Tenure.

5.1. The tenure laid down in the case of Officers drawn from the Railways, is as follows :

1. Three years for Senior Scale Officers (Deputy Directors).
2. Four Years for JA Grade Officers (Joint Directors).
3. Five years for Senior Administrative Grade Officers. (Additional Directors and Directors).

5.2. We, however, came across a large number of cases in which the Railway Officers deputed to RDSO were transferred out of this Organisation back to the Railways or Production Units before completing their full tenure. We view this situation with concern. On being posted to RDSO it takes time for an officer from the Railways to refresh his theoretical knowledge and to reorient himself to research and development work. After having spent some time in RDSO, and having developed expertise in a particular field, if such an officer goes back to the Railways before completing his full tenure and is replaced by a fresh incumbent, the level of expertise developed is not utilised. We, therefore, consider it essential that the Officers once posted to RDSO are not transferred back to the Railways or Production Units until they complete their full tenure. If during this period an Officer is due for promotion, his promotional prospects should be duly protected. A suitable mechanism for this purpose may be devised and enforced by the Railway Board.

5.3. We also recommend that the Officers engaged on specific important projects in RDSO, should not be transferred back to the Railways or Production Units till the completion of these projects, irrespective of the fact that they might have completed their normal tenure. Here again, their service and promotional prospects should be fully protected.

5.4. As regards non-gazetted employees to be taken on deputation from the Railways or Production Units for whom we have recommended 25 percent quota of posts in RDSO, their tenure with this Organisation should be 4 years. In their case also, if they are engaged on specific important projects, they should be retained in RDSO beyond their normal tenure, till the completion of these projects.

#### 6.0. Training.

6.1. Continued training in advanced technology is the means employed by the successful research and deve-

lopment institutions for updating the knowledge of their personnel. The opportunities presently available for training of Officers and staff of RDSO in Research Institutions, Academies, Universities etc. are not adequate. The handicap is on account of : (i) inadequacy of funds; at present only Rs. 20,000 per year are available for this purpose in a total budget in 1983-84 of 14.31 crores for RDSO, and (ii) non-existence of trainee posts to enable RDSO employees to be released for training programmes. To rectify these deficiencies, we recommend the following steps.

1. Funds to the extent of Rs. 5 lakhs per year should be allotted to RDSO for training purposes.
2. In order that no problem is encountered in releasing the Officers and staff for useful training programmes, trainee posts to the extent of 5 per cent should be sanctioned in each Directorate of RDSO.

#### 7.0. Expertise development.

7.1. Apart from the selection of the right type of personnel, their further grooming is also essential to enable them to make any worthwhile contribution to research and development efforts. A frequently used means to achieve this objective is a carefully designed system of continuously updating their professional knowledge by exposing them to the latest developments in areas of interest to them.

7.2. To achieve this objective, RDSO should develop intimate links with other specialist institutions within the country as well as abroad, engaged in problems and pursuits of interest to the Railways. There should not only be exchange of ideas but also of personnel with them on a continuing basis. Some of the leading Research and Development institutions within the country are :

CSIR;  
Institute of Science, Bangalore, Indian Institute of Technology, Tata Institutes of Fundamental Research, Research and Development Institutions of Industrial Organisations like BHEL, SAIL, TISCO, TELCO etc.

7.3. Officers from RDSO should be encouraged to frequently visit these institutions and discuss their problems with their scientists and technologists. Similarly, experts from these institutions should be invited to visit RDSO and deliver lectures and hold discussions on subjects of interest to the Railways. This would greatly help in updating the professional knowledge of research and development personnel.

7.4. RDSO has also to forge closer links with the research and development institutes of foreign Railways. To some extent, this is already being done, and the Indian Railways are represented through RDSO on the UIC/ORE\* which gives them access to their research publications. Whenever ORE constitutes new committees for study of 'Questions', involving in-depth research investigations, in particular aspects of railway working, RDSO also receives an enquiry for nominating members on these committees. However, RDSO has not so far participated in the committee discussions and other deliberations and has thus not been able to meaningfully associate itself with the research investigations of ORE, mainly due to financial constraints. Its links with UIC and ORE have

\* UIC : International Union of Railways, Paris, France.

ORE : Office of Research & Experiment, Utrecht, Netherlands.



therefore, been primarily restricted to the receipt of their technical publications. RDSO also maintains some contacts with the American Association of Railroads (AAR), Washington, JNR\* Technical Research Institute, Tokyo, the British Railway Research Centre, Derby etc. Again, these contacts are mainly in the nature of obtaining technical literature published by those institutions. This is an indication of the lack of perspicacity of the administration. These links should be made much more effective.

7.5. Within the country, RDSO personnel should be encouraged to participate in seminars, write papers for technical journals and deliver lectures in professional forums. This would go a long way in their exposure and in improving their professional knowledge.

7.6. The Officers and staff of RDSO should be encouraged to become members of professional institutions in India like the Institution of Engineers India etc. and participate in their deliberations. To encourage this, annual membership fees of these institutions should be reimbursed to them for the period they are in RDSO.

7.7. Finally, the Officers and staff, during their tenure with RDSO, and while they have access to the facilities of this Organisation, should be encouraged to improve the level of their technical knowledge by working\*\* for higher qualifications like post-Graduate and Ph. D. degrees, as external students. For this purpose, a scheme of suitable incentives may be devised.

#### 8.0. Director-General, RDSO : selection and tenure.

8.1. It is vital for the success of RDSO that its head, who should be fountainhead of initiative, drive and leadership for its activities, should be a highly competent person. He should also hold this post for a sufficiently long period so as to provide continuity in pursuing the research and development projects approved by the Railway Board. The head of this Organisation has, therefore, to be selected with due attention and care. This point was also stressed by the Kunzru and Wanchoo Accidents Enquiry Committees of 1963 and 1969 respectively. Relevant extracts of their recommendations are as under :

*Recommendation No. 175 of the Kunzru Accident Enquiry Committee (1963) Report-Part II.*

"We consider that the greatest care and discrimination should be exercised in the selection of the Head of RDSO, this should have precedence over other requirements of the Railways, and we suggest that the incumbent of this post should continue to hold office for a sufficiently long period to enable him to carry out in a satisfactory manner the programmes approved by the Research Council."

*Recommendation No. 319 of the Wanchoo Accident Enquiry Committee (1969) Report-Part-II.*

"We had suggested in Part I of our Report that the Head of RDSO should have long enough tenure to make an impact on the organisation. If this involves a still higher grade for the post temporarily to enable the incumbent to continue, the upgrading would, in our view, be justified."

8.2. Both the above recommendations were accepted by the Railway Board. We, however, find that during

the last 23 years since the inception of this post in RDSO, there have been as many as 20 Directors-General giving an average tenure of an incumbent of about one year. A list of the various Directors-General posted so far, together with the durations of their stay in this Organisation, is given in Annexure A.4.3. The period in one case for a Director-General has been only seven days. Only two of them (Mr. De Sa and Dr. Srinivasan) can be considered to have had normal tenures. We are constrained to point out that the Railway Board have failed to implement the above recommendations.

8.3. We reiterate that the Director-General must have a minimum tenure of three years if he has to make any meaningful contribution to the functioning of RDSO. Further, he should be a very competent and brilliant Officer. He should come from one of the Engineering sciences, and should have adequate administrative ability and scientific knowledge to coordinate the research efforts of the various disciplines.

8.4. In fact, we would even go to the extent of recommending that the Railways would do well to look for a worthy incumbent if necessary outside the Railways, and from India or even abroad. The experiment in our opinion is highly desirable and will prove to be of great merit in the growth of the system.

#### 9.0. Conclusions.

9.1. The composition of the existing employees in RDSO is ill-suited for the role assigned to this Organisation. As many as 44 per cent of the technical employees do not hold any technical qualifications 'at all'. This situation stands in sharp contrast to the educational profile of the employees of other research organisations abroad or within the country which not only ensure that all the technical jobs are manned by suitably qualified persons, but also have sizeable percentage of their staff with post-Graduate and Ph. D. qualifications. Urgent action is needed to rectify this deficiency.

9.2. There is also need to induct in RDSO experts in areas such as computers, higher mathematics, statistics, vibrations, plastics, tribology, instrumentation etc., of whom there is none in RDSO at present.

9.3. The recruitment and promotional policies of RDSO have to be modified to attract as many Engineering Graduates as possible for the jobs of Research/Design/Technical Assistants. It has also to be ensured that no employee gets promoted as Assistant Research/Design Engineer or to any higher jobs unless he possesses an Engineering Degree.

9.4. The role assigned to RDSO requires field experience for its manpower at senior levels. The existing policy of drawing officers from the Railways for bulk of the senior posts in RDSO should, therefore, continue. In the non-gazetted cadre also, 25 per cent of RDSO's employees should be drawn from the Railways.

9.5. To assist the development of expertise and to provide continuity in the R and D projects the tenure of the employees drawn from the Railways should be increased to eight years. Even this stipulation about the tenure should be considered only as a guideline, and when it is considered necessary to retain any employee in RDSO beyond this period in the interest of work, there should be no hesitation in doing so, duly protecting his promotional prospects.

\* Japanese National Railways.

\*\* Indian Institutes of Technology and a number of other Uni-

versities recognise RDSO for the purpose of registering its employees as external students for M. Tech. and Ph. D. degrees.



9.6. To update the professional knowledge of RDSO employees, and to expose them to the latest developments in their field of interest, they should be frequently deputed for training in the national Research Institutions, Academies, Universities etc. For this purpose, funds earmarked for training need to be considerably increased.

**9.7. RDSO should have greater interaction with the research institutions within the country as well as abroad.**

9.8. There should be a minimum tenure of 3 years

for Director-General of RDSO and he should be a very competent and brilliant Engineer, with proper administrative ability and scientific knowledge so that he is able to provide continuity in pursuing R and D projects approved by the Board.

9.9. The Railways would do well to look for a worthy incumbent of Director-General if necessary outside the Railways, and from India and even abroad. The experiment in our opinion is highly desirable and will prove to be of great merit in the growth of the system.

Annexure A. 4.1

(Cf paragraph 3.1

### Details of sanctioned strength of RDSO as on 1-1-1983

[illegible]



**Recruitment/Promotion methods & grade for employees of the Technical Directorates of the RDSO.**

<u>Designation</u>	<u>Grade</u>	<u>Recruitment/Promotion method</u>	<u>Minimum qualification/Experience</u>
<b>A. Non-Gazetted.</b>			
1. Tracer	Rs. 260-430	100 percent by direct recruitment	Matriculation till recently, now Diploma in draftsmanship.
2. Laboratory Assistant.	Rs. 260-430	100 percent by promotion from among the eligible staff of RDSO, shortfall if any, to be made by direct recruitment.	Matriculation with Science with three year experience for departmental candidates. Intermediate with Science for direct recruits.
3. Draftsman Grade 'B'.	Rs. 330-560	100 percent by promotion from Tracers	Diploma in draftsmanship with three years experience as Tracer.
4. Draftsman Grade 'A'.	Rs. 425-700	100 percent by promotion from Draftsmen Grade 'B'.	Diploma in draftsmanship with three years experience as Draftsman Grade 'B'.
5. Junior Research Assistant.	Rs. 425-700	50 percent by direct recruitment and 50 percent by promotion from Laboratory Assistants.	Diploma in engineering with one year experience for direct recruits. 6 years experiences as Laboratory Assistant for departmental candidates.
6. Research/Design Assistant.	Rs. 550-750	50 percent by direct recruitment and 50 percent by promotion from Draftsmen Grade 'A'.	Diploma in engineering with three years experience or a degree in engineering for direct recruits. 3 years experience as Draftsman Grade 'A' for departmental candidates.
7. Technical Assistant	Rs. 550-750	100 percent by transfer from Railways on selection basis.	3 years suitable experience in Grade Rs. 425-700.
8. Documentation Assistant/Research Assistant.	Rs. 550-900	100 Percent by promotion except in metallurgical and chemical engineering disciplines. Shortfall, if any, to be made up by direct recruitment. For metallurgical and chemical engineering disciplines 50 percent by direct recruitment and 50 percent by promotion.	Diploma in engineering with three years suitable experience or degree in engineering.
9. Senior Design/Documentation/Research Assistant.	Rs. 650-960	100 percent by promotion	3 years experience as Design/Technical Research Assistant.
<b>B. Gazetted.</b>			
1. Assistant Design/Research/Inspecting Engineer. Assistant Research Officer.	Rs. 650-1200	100 percent by departmental selection from non-gazetted staff.	
2. Deputy Director	Rs. 1100-1600	20 percent by promotion from the RDSO cadre i.e. Assistant Design/Research/Inspecting Engineer; and 80 percent deputation from the Zonal Railways.	Engineering graduate
3. Joint Director	Rs. 1500-2000	100 percent by deputation from the Railways. Recently about 5 posts have been earmarked for RDSO cadre.	Engineering graduate.
4. Additional Director	Rs. 2250-2500	100 percent by deputation from the Railways.	Engineering graduate.
5. Director	Rs. 2500-2750	100 percent by deputation from the Railways.	Engineering graduate.

## Annexure A.4.2

(Cf para 8.2)

**List of Directors General**

<u>Name</u>	<u>Period</u>		
1. S/Shri P.C. Neogi	27-4-59-5-11-60	9. „	R.M. Sambamoorthi 27-2-76-28-6-76
2. „ A.C. Mukherji	25-2-61-21-10-61	10. „	G.N. Bhattacharya 29-6-76-31-12-77
3. „ R.E. De Sa	22-10-61-31-3-64	11. „	B. Mohanty 31-3-78-31-12-78
4. „ P.C. Kapoor	18-8-64-3-2-65	12. „	K.A. Jacob 1-1-79-18-5-79
5. „ K.C. Sood	8-3-65-13-2-67	13. „	B. Mohanty 19-5-79-31-10-80
6. „ P.N. Mathur	20-3-67-23-4-68	14. „	L.F.X. Freitas 1-11-80-30-11-81
7. Dr. M. Srinivasan	23-9-68-23-3-74	15. „	M.K. Kapur 21-12-81-11-1-82
8. S/Shri T.V. Joseph	19-5-74-26-2-76	16. „	K.G. Belliappa 20-1-82-7-5-82
		17. „	J.C. Gupta 8-5-82-23-11-82
		18. „	M.K. Gamkhar 24-11-82-23-12-82
		19. „	M.G. Belliappa 24-12-82-31-12-82
		20. „	M.K. Ganbhar 1-12-82- „



## CHAPTER V

### RDSO : ORGANISATION

#### 1.0. Introduction.

1.1. We have delineated the future role of RDSO in Chapter III. We have also mentioned the shortcomings in the present manpower policy for RDSO, and have given our recommendations to overcome them. To effectively perform the functions assigned to RDSO, this Organisation, besides upgradation of its manpower, will need considerable reorganisation and streamlining. The delegated powers of the Director-General and other Officers would also have to be enhanced suitably.

1.2. At present, RDSO functions as an 'attached office' of the Railway Board. We consider this arrangement antiquated. We, therefore, recommend that RDSO should not be an 'attached office' but should enjoy the same autonomy as that of a Zonal Railway. The existing terms and conditions for Officers and staff coming on deputation to RDSO should, however, not be disturbed as otherwise it will be impossible to attract suitable incumbents.

#### 2.0. Organisation.

2.1. There is no Directorate in RDSO doing research in 'accident prevention'. Some of the Directorates in RDSO have also become unwieldy in their present set-up. This situation is likely to deteriorate when additional R and D projects are taken up by these Directorates to cope with the increased projections of rail-borne traffic in future. In such a situation, the Directors would not be able to devote adequate personal attention to the various R and D projects. Therefore, some of the existing Directorates would need to be reorganised and a few new Directorates would have to be set up.

2.2. 'Accident Prevention Directorate.—Accidents bring in their trail misery and misfortune. They sometimes also involve loss of life and limb as well as property besides interruption in the flow of traffic. During 1981-82, the number† of those killed and injured in accident was 666 and 1,154 respectively. Bulk of these accidents have been ascribed to 'human failures'. No research however, seems to have been conducted by the Railways to see whether the human failures were due to bad design of equipment, shortcomings in rules and regulations, unfavourable working environment, long duty hours etc.

2.3. We, therefore, recommend that a Directorate of Accident Prevention should be set up in RDSO. This Directorate should conduct in depth investigations into the various causes which lead to an accident and suggest measures for improving the design of equipment, modifying rules and regulations etc. for improving safety of rail travel. The Directorate should go into the aspects of not only 'hardware content' of accidents, but also the software in 'human failures'.

2.4. *Signalling and Telecommunication Directorate.*—At present, R and D activities concerning signal Engineering and Telecommunications are undertaken by the Signalling & Telecommunication Directorate. In this field there have been fast and continuous advances. New systems like automatic signalling, route relay interlocking, centralised traffic control etc. have come into vogue.

2.5. In the field of telecommunication also, altogether new technologies involving advanced knowledge of electronics are now coming into use. Some of these technologies which have revolutionised communications are micro-wave system, fibre optics, satellite communications, digital communications and computer networking. Advanced railway systems have already started utilising these new technologies to improve their communication networks. The Indian Railways, have, however, lagged behind also in the use of these new technologies. This is a situation which needs to be retrieved by RDSO and the Railway Board.

2.6. We consider that it is no longer possible for the Directorate of Signalling and Telecommunication to deal with the problems of Signalling as well as to give adequate attention to Telecommunications. We, therefore, recommend that the signalling and Telecommunication Directorate be split up into two Directorates, one for Signalling and the other for Electronics and Telecommunications. The latter Directorate should also cater to the requirements of other departments of the Railways which, of late, have been acquiring machines fitted with sophisticated electronic controls.

2.7. *Traffic Research Directorate.*—The Traffic Research Directorate has so far been playing a very limited role. It has not undertaken any project worth the name in the field of transportation research. On the contrary this Directorate has more or less been functioning merely as a psycho-technical Cell, rendering advice to the Railway Service Commissions and the Zonal Railways in the selection and placement of running staff. As we have said earlier (Cf. para 2.5 this is a rather miniscule Directorate and is doing little more than giving lip-service in the name of research. In advanced Railways abroad, like SNCF\*, BR\*, DB\*, CNR\*, CPR\*, and JNR\*, Traffic Research occupies a very vital and focal position in the entire spectrum of research and development endeavours of the respective systems.

2.8. We consider that this Directorate should play a much greater and more vital role and undertake research in transportation and commercial problems such as optimisation of traffic flows reducing detentions in yards and terminals, increasing average speed of goods trains, improving wagon turn round, marketing of new streams of traffic, development of rolling stock and flow-patterns to suit the requirements of traffic growth, operational research, traffic cybernetics etc.

† Statement 41(b) of the Indian Railways Annual Statistical Statements 1981-82.

\* SNCF — French National Railways  
BR — British Railways B

DB — German Federal Railways  
CNR — Canadian National Railways  
CPR — Canadian Pacific Railways  
JNR — Japanese National Railways



2.9. This Directorate would naturally therefore also have to associate itself more actively with the process of design of new rolling stock so that problems likely to be faced by the users of their introduction in service can be visualised and solved at the design stage itself. Similar co-operation in research and development endeavours will have to be sponsored and monitored by this Directorate for terminal handling, loading and unloading arrangements. We have tried to delineate in the next chapter some of the areas in which the Traffic Research Directorate should take up R and D activities seriously.

2.10. To perform this enlarged role, the Traffic Research Directorate would need to be adequately strengthened and staffed with bright Officers with proven merit, experience, vision and perspicacity. It is time the Railway Board graduated from a medieval approach in traffic research and developed a properly staffed, expanded and worthwhile Traffic Research Directorate, and charged it with appropriate research and development responsibility. In our opinion for the overall perspective growth of the system, the selection of Director Traffic Research should be considered much more important than of Director Traffic Transportation in the Railway Board.

2.11. *Research Directorate.*—This Directorate has the responsibility of conducting applied research in the disciplines of Civil and Mechanical Engineering, besides undertaking testing of all types of rolling stock. Applied research in all other disciplines is the responsibility of the respective Directorates dealing with those disciplines. We do not see any logic or pragmatism in the Research Directorate continuing to have the responsibility of applied research in the disciplines of civil and Mechanical Engineering alone, while this function in other disciplines vests in the respective Directorates.

2.12. We, therefore, recommend that applied research in Civil and Mechanical Engineering should also be transferred to the respective Directorates dealing with these disciplines, viz. Civil Engineering Directorate for the former and Motive Power, Carriage and Wagon Directorates for the latter.

2.13. Whenever any new type of locomotive, carriage or wagon is introduced, or the speeds of the existing ones are increased, the Railways have to undertake extensive speed trials to ensure that the safety and comfort parameters are not compromised. These trials, by their very nature, involve a very close interaction between the disciplines of permanent way and rolling stock.

2.14. This requirement renders it necessary for such trials to be conducted by a single Directorate which has expertise in both these disciplines. Such a situation obtains only in the present Research Directorate since it has representation of both Mechanical and Civil Engineers. The responsibility for undertaking testing of locomotives, carriages and wagons should, therefore, continue with the present Research Directorate. However, after this Directorate is divested of the functions of applied research in Civil and Mechanical Engineering it should be re-designated as Directorate of Testing (Track and Rolling Stock) and its staff strength reviewed. The Traffic Research Directorate should be closely associated with its work.

2.15. *Civil Engineering Directorate.*—Besides being responsible for keeping the Indian Railways abreast of the latest developments in the field of permanent way,

formation engineering and railway structures, this Directorate has also to look into the problems of railway bridges. In the field of railway track this Directorate has helped in the introduction of long welded rails, elastic fastenings, concrete sleepers, ballastless track etc.

2.16. While this is some consolation, this Directorate has to ensure that development in permanent way engineering is kept in step with developments in advanced Railway systems abroad, not only in the matter of track structure, but also in its renewal and replacement techniques.

2.17. In the sphere of bridge engineering, this Directorate has only a few achievements and has yet to initiate and organise R and D efforts in a significant way.

2.18. In this context, the Kunzru Accidents Enquiry Committee has stated : "We have the frank admission in evidence that we are not keeping pace with the modern developments in the design of bridges. For instance, we have not gone into development of continuous girders for use on the Railways. We have gone in for prestressed concrete girders but we have no standard designs for such girders. This merely indicates that there is field for increased activity in this Directorate if we are looking for adoption of modern techniques in bridge building". Things have not changed much since then. In the absence of adequate back-up facilities from RDSO, the vast potential for use of prestressed concrete girders or continuous steel girders for railway bridges still remains unexploited.

2.19. Railway bridges on major rivers have to be protected against floods by undertaking 'river training works'. At present, RDSO is not equipped for dealing with this subject. As a result, the Railways have to seek consultancy services from other research institutions for investigation and design of 'river training works' for problem bridges.\*\* Since this work is of a continuing nature, it would be worthwhile to develop facilities in RDSO for undertaking investigation and design of 'river training works'.

2.20. We consider that it would not be possible for the Civil Engineering Directorate to satisfactorily handle R and D problems in respect of track as well as bridges and other structures. We, therefore, recommend that this Directorate be split up into two, one for Track Technology and the other for Bridges and Structures.

2.21. *Architecture Directorate.*—This Directorate is responsible for preparing architectural designs for major building projects being undertaken by the Railways. The major projects handled by this Directorate so far include the designs of underground stations for the Metro Railway, Calcutta, multistoreyed staff quarters in the metropolitan cities and major remodelling schemes of a large number of station buildings.

2.22. However, with the large number of building programmes for major projects, station building, staff quarters etc., which are likely to be taken up in future all over the Railways, it will not be possible for a central Architecture Directorate, located in RDSO, to effectively handle all these projects. We also consider that in the matter of architectural designs, the Railways should be free from an efflorescence of minds, rather than going in for the sacrosanct designs of a few in this Directorate.

\* Paragraph 206 of the Part II Report of Kunzru Accidents Enquiry Committee (1963).

\*\* This has very often created many unfortunate delays and confusions. One typical instance is the river training study for the Bagha-Chhitani line of North Eastern Railway.



2.23. We, therefore, recommend that this Directorate be altogether disbanded. For major projects like new production units, prestigious station buildings, multi-storied housing projects, etc., the Railways should advantageously obtain the consultancy services from well-known firms of architects, Research Institutions and Universities. Even now this has been done, to very great advantage, by entrusting the architectural designs for the Wheel and Axle Plant, Bangalore and the Diesel Components Works, Patiala to private firms of reputed architects. We recommend that for all future major projects, services of well-known architects should be commissioned.

2.24. For architectural designs of other than the major projects, the Railways may have a small facility in the Zonal headquarters, so that the plans could be prepared and signed by architects, as necessary, for acceptance of Town Planning and Local Authorities. For this creation of new posts should not be necessary and it should be possible to accommodate this requirement from the strength released from RDSO.

### 3.0. Delegation of powers.

3.1. The issue of delegation of powers will be dealt with by the Committee extensively in a later Report on 'Organisation'. At this stage, we have restricted our enquiry into the powers delegated to the Director-General of RDSO and his Officers and the need for their enhancement.

3.2. Director-General of RDSO has the rank of a General Manager of a Zonal Railway and has been delegated the GM's powers\* in financial and establishment matters. These powers have to be exercised by him 'after consultation with the Associated Financial Adviser\*\*'. During the course of the discussions@held by the Committee with Director-General, RDSO and his Principal Officers, it was represented by the latter that Director-General had no powers to overrule the financial advice when he considered it necessary to do so in the interest of work and furtherance of R and D efforts.

3.3. We feel that the interpretation placed by Director-General on the phrase 'after consultation with the Associated Financial Adviser' to mean that it is incumbent upon him to accept the financial advice is not at all correct. The powers of the Director General, RDSO are the same as that of the General Manager of a Zonal Railway. The Director General, like the GM of Railway is, therefore, also empowered to overrule the financial advice. We would recommend that Railway Board should issue a forthright clarification.

3.4. The activities being undertaken by RDSO are, however, of an entirely different nature than those on a Zonal Railway. In the pursuit of R and D, one has often to work in unknown domains and has necessarily to take risks and decisions where results may be uncertain. On account of this special feature of the R and D endeavour, the powers of Director General, RDSO in certain areas have to be greater than those of a General Manager.

3.5. We have considered the question of enhancing the powers delegated to Director General and other Officers of RDSO in the light of our discussions in the foregoing paragraphs. Our recommendations in this regard are as follows.

1. Within the overall budget allotment, Director-General should have full powers to nominate Officers and staff of RDSO to training programmes, symposia and seminars, organised within the country by Research Institutions of repute, Universities, Indian Institutes of Technology etc. where the course fees for a single seat do not exceed Rs 5000/-. At present, his powers in this regard are limited to Rs. 1000/- per case, subject to a maximum of Rs. 20,000/- in a financial year. There should however be a corresponding increase in the budget for training as already discussed by us in Chapter IV.
2. In the matter of engagement of Consultants or Specialists needed for short periods for specific projects or farming out research studies to Universities, Academics, Research Institutions of repute, Indian Institutes of Technology etc., Director-General should have full powers, within the budget allotment, where the fees for a single consultancy study do not exceed Rs. 50,000/-.
3. Against consultancy works being undertaken by RDSO for the outside parties, Director-General should be authorised to create temporary posts in non-gazetted/gazetted cadres upto Junior Administrative Grade, within the consultancy fees realised from such parties.
4. At present, there is almost complete centralisation of powers in the Director-General and the Directors, Additional Directors and Joint Directors of RDSO hardly enjoy any powers in financial matters. The success of an R and D project depends, to a large extent, on the project leader, who may be a Director, Additional Director or even a Joint Director. The progress of these projects gets hampered if the project leader has to approach Director-General even for minor purchase of equipment or stores. In the interest of expediting R and D projects, we recommend that the Directors, Additional Directors and Joint Directors should also be delegated powers suitably and they could report the purchases to Director-General for information.

### 4.0. Conclusions.

4.1. In the interest of efficiency and effectiveness of performance, RDSO would require considerable reorganisation and streamlining.

4.2. Railway accidents lead to loss of life and property. A Directorate for 'Accident Prevention' should be set up in RDSO. The task of this Directorate

\* Except in case of training of staff where the powers of Director-General, RDSO are less than those of a General Manager of a Railway.

\*\* The Associated Financial Adviser in this case is only a Joint Director, Finance.

@ The discussions were held on 30 April, 1982 on the occasion of the Committee's visit to the RDSO.

† These need not necessarily be Government Institutions. The Railways should be able to look beyond their own sphere and be able to unhesitatingly go to such reputed Research Institutions in the private sector as the Tata Institute of Fundamental Research, etc.



would be to carry out an in-depth analysis of the possible causes of accidents and suggest improvements in equipment, maintenance and operational practices, rules and regulations etc., with a view to ensuring greater safety in rail travel. The Directorate should go into not only the hardware content of accidents, but also the software of 'human failures'.

4.3. There have been big advances in the field of railway signalling, tele-communications and electronics in the developed countries. Neither the Railways nor the concerned Directorate in RDSO have been able to keep in step with such developments. Development in electronics and communications has particularly suffered.

4.4. A single Directorate for the disciplines of railway signalling and telecommunications in RDSO is not considered sufficient to look after the R and D problems of these two disciplines either adequately or effectively. This Directorate should be split up into; (i) Directorate of Railway Signalling and (ii) Directorate of Electronics and Telecommunications.

4.5. The present Traffic Research Directorate is only a miniscule Directorate giving lip-service to research.

4.6. In advanced Railways like SNCF, CP, CN, JNR, DB and BR, Traffic Research occupies a very vital and focal position in the entire spectrum of research and development endeavours. Not so in RDSO. Here the Directorate is not adequately staffed or equipped to undertake research in the field of railway transportation, commercial affairs and marketing research. As a result, this Directorate has merely been functioning as a psycho-technical cell, rendering advice to the Railway Service Commissions and Zonal Railways for the selection and placement of running staff.

4.7. This Directorate will have to be considerably strengthened to undertake R and D projects in the field of transportation as specified by us. Officers of proven merit and experience, vision and perspicacity should be drafted and the Directorate charged with vigour and enterprise.

4.8. The function of applied research in all other disciplines except Civil and Mechanical Engineering is the responsibility of the Directorates dealing with those disciplines. In the case of Civil and Mechanical

Engineering, however, this responsibility is with the Research Directorate. There is no logic in continuing this arrangement. The responsibility for applied research in the disciplines of Civil and Mechanical Engineering should also be transferred to the respective Directorates viz., Civil Engineering Directorate for the former and Motive Power, Wagon and Carriage Directorates for the latter.

4.9. The Research Directorate would then be left with only the function of testing rolling stock and should be re-designated as Directorate of Testing (Track and Rolling Stock) and its staffing suitably reviewed. There should be close and continuous coordination with the Traffic Research Directorate.

4.10. The present Civil Engineering Directorate is not able to cope with the R and D problems in respect of the disciplines of railway track, bridges and other structures. In fact, bridge engineering and structure callisthenics have almost gone by default. We recommend that this Directorate be bifurcated into: (i) Directorate of Track Technology and (ii) Directorate for Bridges and Structures.

4.11. The Architecture Directorate should be abolished. For major projects like new production units, workshops or prestigious station buildings, services of reputed architects, universities and other research institutions should be utilised, as has been done, to good advantage, in the case of the Wheel and Axle Plant and the Diesel Components Works. This will enable the Railways to avail themselves of the best expertise available anywhere within the country in this field.

4.12. For architectural designs of other than the major projects, the Railways may have a small facility in the Zonal headquarters, so that the plans could be prepared and signed by the architects, as necessary, for acceptance of Town Planning and Local Authorities. For this creation of additional posts should not be necessary and it should be possible to accommodate this requirement from the released strength of RDSO.

4.13. For cutting red-tape and expediting R and D projects, powers of Director-General RDSO need to be enhanced considerably. Directors, Additional Directors and Joint Directors, who often happen to be project leaders in R and D projects should also be delegated adequate powers.



## CHAPTER VI

### RDSO: EQUIPMENT, RESOURCES AND AREAS OF RESEARCH

#### 1.0. Introduction.

1.1. Availability of modern equipment and laboratory facilities is an essential concomitant for research activities. R and D organisations of the advanced railway systems invariably have the most sophisticated equipment and instrumentation. We have been informed that the Railway Testing and Research Institute of the Japanese National Railway at Tokyo, which is one of the best-equipped railway research centres anywhere in the world, has 34 laboratories, having the most sophisticated equipment, ultra-modern instrumentation, and testing facilities for investigating the in service behaviour of all types of railway equipment.

1.2. In contrast, the equipment and testing facilities available at RDSO are either obsolete or inadequate and are not even proportionate to their present requirements hemmed by very limited R and D endeavours. Our visits and discussions with the concerned authorities revealed that the equipment and facilities available in many of the laboratories of RDSO were not adequate even for carrying out the functions of applied research, testing and maintenance and service engineering work, not to speak of being in a position to undertake long-term and perspective research programmes leading to the development of advanced generations of rolling stock and other equipment.

1.3. The Railways have not been allotting sufficient funds for R and D. Due to non-availability of adequate funds, many important testing facilities have not yet been set up in RDSO. It has also not been possible for this Organisation to undertake a number of important R and D projects which could have helped the Railways in improving the performance of equipment and productivity of manpower.

#### 2.0. Equipment and laboratory facilities.

2.1. In our view, following additional equipment and laboratory facilities are essential for the RDSO.

1. *Computer Centre.*—No R and D centre of the magnitude required for a railway system like the Indian Railways can be complete without a modern computer centre for assisting in research and design work. It is difficult to believe that there are no computer facilities at all in RDSO at present. It is understood that a computer centre has recently been sanctioned for RDSO. We recommend that the installation of this computer should be expedited. The computer is also necessary for documentation and storage of information and its retrieval. This computer centre can also be utilised initially by the proposed research centres for advanced railway technology. When the workload in these centres gains momentum, it may become necessary, in the long run, to provide independent computers for each of these centres.

2. *Captive test track.*—At present, all testing of prototypes and existing rolling stock, track, OHE\*, etc. has to be done on the open line railway systems. The RDSO staff and equipment have to be sent for this purpose to suitable locations. This involves coordination with the Zonal Railways for availability and selection of test track, traffic blocks, locomotives, rolling stock and stabling facilities. Due to traffic demands, the Railways quite often find it difficult to provide facilities when requested, resulting in considerable delays in planning and execution of investigations.

Further, the present methodology does not permit tests being extended to the threshold of instability and assessment of the design capability of the permanent way and rolling stock to its limits. This is due to the requirement of safety in operation over the open line. These drawbacks of 'on-line' tests were also pointed out\*\* by the Sikri Accidents Enquiry Committee 1979, as indicated below :—

- (i) "there is lack of flexibility in incorporating different parameters in the design and incorporation of modifications on the prototype involves considerable time and effort followed by costly time-consuming re-tests;
- (ii) on safety considerations, the vehicle cannot be tested upto the threshold of derailment on running lines which is necessary for arriving at realistic criteria for judging stability and for evolving a more comprehensive appreciation of the mechanics of derailments;
- (iii) track parameters cannot be varied individually or severally for assessing their effect on vehicle riding so as to lay down limiting values for various parameters concerning track ;
- (iv) certain phenomena like axle and bogie hunting at high speeds, bogie and axle guiding action on curves with and without braking and traction forces, derailment tendencies of vehicles on curves when subjected to coupler loads and dynamic deflections of vehicles and natural frequencies cannot be safely simulated and studied in actual field trials; and
- (v) with increasing traffic density and non-availability of blocks, 'on-line' tests are costly and time-consuming.

We, therefore, recommend that RDSO should have its own captive test track, fully equipped with all facilities.

\* Overhead equipment.

\*\* Paragraph 629 of Part I Report of the Sikri Accidents Enquiry Committee.



ties for conducting trials of prototypes, new rolling stock or the existing rolling stock, OHE, track fittings, etc. This test track should be built as close to Lucknow as possible. It should have both BG and MG tracks. Although the test tracks may be attached to RDSO the proposed Research Centres for Advanced Railway Technology should also utilise them for carrying out tests for the new prototypes to be designed by them.

3. *OHE recording-cum-research car.*—RDSO has no facilities at present for research work on over-head traction equipment. Since the Indian Railways have a programme to go in for electrification in a big way\* in the coming years, much research and testing work would have to be done on OHE installations. We, therefore, recommend that RDSO should procure a recording-cum-research car with on-board real time computer facilities for testing of OHE.

This car should be attached to the Traction Installation Directorate of RDSO.

4. *Vehicle Dynamics Roller Test Rig.*—With the increase of the rolling stock and the introduction of fast non-stop trains, the subject of vehicle dynamics has assumed greater importance. Research on the various aspects of riding quality of rolling-stock from the viewpoint of safety and comfort as also stress analysis of vehicle structures cannot be ignored. At present, these studies are being conducted by field trials. RDSO have stated that these field trials suffer from various drawbacks, for instance :

- (i) The track parameters such as gauge alignment, unevenness, twist, cant and cant gradient cannot be varied to any appreciable extent.
- (ii) Certain phenomena like the axle and truck hunting at high speeds cannot be safely simulated and studied.
- (iii) Phenomena like (a) truck and axle guiding action on curves, (b) derailment tendency of individual vehicles on curves when subjected to coupler loads, (c) fatigue studies of complete vehicles under actual vibration and environmental conditions (d) dynamic car body deflections and natural frequencies in various modes cannot be fully studied.

On account of these limitations we consider that a vehicle dynamics roller test rig should be provided at RDSO. This rig should have simulation techniques for stationary testing of prototype vehicles with varying speeds and track conditions as required.

5. *Electronics Laboratory.*—The existing Signalling and Telecommunication Laboratory caters mainly for electrical and electro-mechanical signalling, and no facilities for testing and evaluation of electronic systems and sub-systems including components are available. In modern signalling and telecommunications, electronics play a vital role in the design and manufacture of various components.

We, therefore, recommend that a fullfledged Electronics Laboratory should be set up in RDSO. This laboratory should be attached with the Electronics and Telecommunication Directorate, the setting up of which we have recommended in Chapter V.

6. *Additional facilities for testing of carriages and wagons.*—At present, certain important facilities for testing the various components of carriages and wagons are not available in RDSO. These facilities are :

- (i) Suspension Testing Machine for testing springs.
- (ii) Axle Box/Roller bearing test rig for evaluating the performance of roller bearings.
- (iii) Wheel Set Testing Machine for investigating wheel stresses and the nature of damage to the tread of wheels under combined vertical, lateral and braking loads.
- (iv) Compression and Tension Bench for subjecting the body of the carriages and wagons to service loads with a view to optimise the body designs.
- (v) Vibration Testing Unit for studying the structural design of rolling stock bodies.
- (vi) Rotational Test Rig for investigating frictional torque of bogies to improve the stability of vehicles.
- (vii) Torsional Rigidity Measuring Rig for measuring torsional stiffness of wagons and thus to assess the ability of these wagons to negotiate track twists.

In our view, the above facilities will greatly help in optimising the designs of carriages and wagons and should be urgently provided.

7. *Track Components Laboratory.*—This laboratory has facilities for testing track components viz. rails, sleepers, fastenings etc., by subjecting them to service loads. The existing testing facilities in the laboratory are, however, inadequate in as much as it is not possible to subject the track components to variable loading with variable frequency. There is also no facility for recording and analysing dynamic strains, accelerations and displacements. We recommend that these facilities should be provided in this laboratory.

8. *Rock Mechanics Laboratory.*—A small Rock Mechanics Laboratory is attached to the Research Directorate with the limited objective of undertaking investigations and design of foundations of structures on rocks and stability of rock cuttings. The facilities in the Rock Mechanics Laboratory are, however, not adequate to undertake investigations into the problems of railway tunnelling, land slides etc. We recommend that the equipment in the Rock Mechanics Laboratory be augmented to undertake these investigations also.



### 3.0. Library and Documentation facilities.

3.1. For the success of its R and D plan, it is necessary that the Organisation should keep itself abreast of the last scientific and technological developments in research institutions in the advanced countries. This would obviate wasteful efforts on problems which have already been successfully solved elsewhere. Instead of undertaking studies ab initio the research can then be progressed from the stage already reached by other countries.

3.2. To meet this requirement, a well-developed information system has to be set up. In addition, it is also necessary that the results of research are communicated to the prospective users. For ensuring this, an efficient system for documenting and disseminating the results of research has to be set up.

3.3. The above role is being discharged by RDSO's Central Library. This library, according to the 1980-81 Annual Report of RDSO, had 17,430 books, 34,027 specifications, 8,852 bound volumes of technical journals and 550 micro films. The library also subscribes to about 350 technical journals. To disseminate the results of its R and D activities, RDSO publishes its research reports for distribution to railway organisations and their constituent units. A quarterly journal known as 'Indian Railway Technical Bulletin' is also brought out by RDSO. This journal is devoted to articles on topics of interest to the Railways. Documentation notes consisting of extracts from the Indian and foreign Railway journals are also published every alternate month. During 1980-81, 60 research reports and other miscellaneous publications were brought out by RDSO.

3.4. It was represented to us that books and equipment in the RDSO library were utterly insufficient. The space available for the library is not adequate even for the present holding of books, references and journals. As a result, the library is too cramped and badly organised. An efficient retrieval system for the information is also lacking. Facilities for micro filming and photo copying of the articles are absent. We have found that the library does suffer from these inadequacies. In our view following steps should be taken to improve library and documentation services :

1. The central library, documentation and information translation facilities should be in a new building. This library should be manned by properly qualified and trained librarians. Adequate funds should be allotted annually for procurement of the latest technical books and literature.
2. Facilities for translation from foreign languages viz. Japanese, French, German and Russian, are virtually absent. We recommend that at least one whole-time translator each for Japanese, French, German and Russian languages, should be provided at this library.
3. In view of the vast amount of information to be dealt with, new techniques of documentation, including the application of computer for indexing, storing and retrieval of information has now become essential. We therefore, recommend that a suitable computer package should be provided for qualifying and storing relevant information and its quick retrieval when required. This will be a part of the computer centre.

4. Adequate facilities for micro filming and reprographic facilities for preparing copies of various documents should be provided in the Central Library.

### 4.0. Funds for R and D.

4.1. The actual expenditure, year-wise, on the RDSO for the past ten years is given in Table 6.1.

Table 6.1

#### Funds allocation for RDSO

(figures in crores of rupees)

S. No.	Year	Actual expenditure on RDSO
1.	1971-72	2.85
2.	1972-73	3.09
3.	1973-74	3.07
4.	1974-75	3.78
5.	1975-76	4.59
6.	1976-77	4.41
7.	1977-78	4.47
8.	1978-79	5.05
9.	1979-80	5.39
10.	1980-81	5.94
11.	1981-82	6.69

4.2. During the course of our discussions with the Director-General and his Principal Officers, it was represented that the budget allotted for RDSO has been inadequate. For want of sufficient funds RDSO has not been able to set up many important testing facilities due to which research efforts have suffered. For instance RDSO still does not have a captive test track, an OHE research-cum-recording car and a vehicle dynamics roller test rig. These deficiencies have already been pointed out by us in paragraph 2.1. Due to inadequacy of funds RDSO has also not been able to undertake many important projects in the areas of design development, service and maintenance engineering, performance improvement of equipment etc. We, therefore, recommend that funds for R and D should be considerably stepped up.

4.3. We are aware that comparisons are odious and sometimes also out of context. Nevertheless, the percentage of allocation of resources on R and D vis-a-vis the overall revenue expenditure on advanced Railway networks like SNCF, JNR, DB, CN, CP and BR tell their own story; it shows while research and development in resource-allocation has been given a focal and vital importance on these systems, on Indian Railways the attention given to R and D is as yet nothing more than lip-service and peripheral.

4.4. We are deliberately not making a comparison with industries of international dimensions like General Electric or General Motors as that would make the Indian Railways research efforts pale into insignificance.

4.5. While on the one hand, allocation for R and D has been clearly inadequate, due to various administrative deficiencies and involved procedures, even this meagre budget allotment was not fully spent. The figures of original budget allotment, revised budget allotment and actual expenditure for the last five years are indicated in Table 6.2.



Table 6.2  
Budget Allotment vis-a-vis Actual Expenditure  
(Figures) in crores of rupees)

Year	Original Budget allotment	Revised Budget allotment	Actual Expenditure
1977-78	5.26	4.81	4.47
1978-79	5.35	5.75	5.05
1979-80	6.36	6.40	5.39
1980-81	6.40	6.27	5.94
1981-82	7.74	7.72	6.69

4.6. The procedures for incurring expenditure are involved and complicated. These will have to be rectified so that the budgetary allotments are fully spent in future.

#### 5.0. Suggested areas for research.

5.1. It is difficult for this Committee to indicate precisely the specific areas of research in the perspective R and D programme to be undertaken by RDSO. These areas will have to be identified by the Railway Board so as to fit in with the long-term corporate objectives of the Railways. In our view, however, following should be some of the areas which should be examined for research effort.

5.2. *Traffic research.* For increasing the productivity of the railway staff and assets, it is important to study the problems of traffic flows and find optimum solutions. The factors to be studied in this connection should cover the problems of line capacity, detentions in yards and terminals, increase in throughput, utilisation of motive power and rolling stock, problems of speed mix. techno-economic feasibility for increasing train speeds and application of newer concepts in transportation etc. The Indian Railways have so far not attempted comprehensive and integrated study of these aspects which can lead to substantial economies, operating efficiency and increase in profitability. Some parts of this which are of immediate interest are highlighted below :

1. *Unit trains.* A review of the results of the working of the Railways indicates that nine bulk commodities\* constitute about 85 percent of the total freight traffic. In most of the cases, the centres for generation and termination of this traffic are fixed and its movement is concentrated on specific routes. In the Railways have to successfully meet the needs of freight traffic by 2000 AD, they would have to increasingly take to the concept of moving traffic in unit trains. Though a beginning has already been made by the Railways in introducing unit trains in respect of some of these commodities, this concept needs to be enlarged.

\* Coal, foodgrains, iron & steel, iron ores and other ores, cement, mineral oil, fertilizers, limestones and dolomite, stones other than marble (including gypsum).

Feasibility of operating unit trains in respect of these bulk commodities, employing special design of freight stock equipped with facilities for mechanical loading and unloading etc., will need to be investigated further.

2. *Average speed of goods trains.*—Published statistics indicate that the average speed of goods trains on many of the world railway system is in the range of 26 to 35 km/h. Data on the average speeds of goods trains for Indian as well as some of the foreign Railways is given in Table 6.3.

Table 6.3.

#### Average speed of goods trains

Name of Railway	Average speed of goods trains (all tractions)
1. Railways of People's Republic of China.	29.0 km/h
2. Japanese National Railways	28.0 km/h
3. Soviet Railways	33.75 km/h
4. Italian State Railways	34.46 km/h
5. German Federal Railways	26.18 km/h
6. Indian Railways (BG) (MG)	20.8 km/h 16.1 km/h

As seen from the above table the average speeds of goods trains on the Indian Railways for all tractions are as low as 20.8 km/h for BG and 16.1 km/h for MG. Even if we consider the BG trunk routes having diesel and electric traction, modern signalling systems and bogie freight stock suitable for maximum speeds of 75 km/h, the average speed of goods trains would be of the order of 24 to 25 km/h and is still very low. In this context, it has also to be borne in mind that on the foreign railway systems quoted above, the maximum permissible speeds for goods trains is about 100 km/h which is not much higher than the maximum permissible speed of 75 km/h prevailing in India. Considerable scope, therefore, exists for increasing the average speeds of goods trains for the country as a whole.

The slow average speed of goods trains has a direct effect on the throughput and the utilization of assets, thus seriously affecting the revenues. Research, therefore, needs to be conducted for making available higher average speeds in our goods trains.

3. *Problem of speed mix.*—At present, on the trunk routes there is wide disparity† in the speeds of the fast passenger and of the freight trains. This feature has adversely affected the line capacity in respect of paths available for operation

† For instance, on Delhi-Howrah route, maximum permissible speeds for Rajdhani Expresses 130 km/h. while the maximum permissible speed for goods trains is only 75 km/h.



of freight trains. For increasing the line capacity and throughput, specially over the nearly saturated trunk routes, it is necessary to reduce this disparity in speeds to the minimum. The Railways should, therefore, study this problem urgently to evolve the most realistic speed mix for the passenger and goods trains. The aim in this regard will be that minimum investments are needed on the infrastructure and the rolling stock to carry maximum number of trains on any route. An integrated approach covering all aspects of the infrastructure such as permanent way, bridges, motive power, rolling stock, signalling etc., will need to be adopted.

4. *Marshalling yards and terminals.*—Marshalling yards and terminals which are responsible for reception, formation, sorting, holding and despatch of trains today are and can remain the major bottlenecks in the smooth operation. There are frequent detentions to stock due to mis-marshalling, wrong despatches, late starts, excessive holdings, damage to consignments etc. An in-depth study on the design concepts of marshalling yards and terminals should be undertaken to evolve more efficient and economic designs. Such a study should include a detailed examination of each of the above issues with a view to formulate recommendations for selective strengthening of facilities in the existing major marshalling yards and terminals, commensurate with the operating requirements. Solutions should also be evolved for streamlining procedures and systems in the existing marshalling yards with the help of modern aids and communications to obviate the need for large scale modifications to infrastructure requiring substantial capital investments.
5. *Containerisation.*—A door-to-door container service was introduced on a limited scale by the Indian Railways in 1966. This service has received favourable customer reaction and has acquired considerable popularity with rail users. Since the container service attracts high-rated traffic leading to better profitability, it will be necessary for the Indian Railways to consider systematic planning for developing these services in a big way. In order to meet the future requirements of the container services, the Railways would have to conduct investigations for identifying traffic suitable for containerisation, its volume, flow pattern, rate of growth, systems of operation, requirement of equipment such as the container and the container flats, handling equipment, terminal facilities etc. These investigations can be undertaken by RDSO in coordination with the Zonal Railways. RDSO should also undertake and monitor research for 'rail bridging' of container-borne international maritime traffic from coast to coast.
6. *Some other areas.*—Besides the above, the Railways have not initiated any research studies so far in many areas such as transport economics, intermodal coordination, traffic cybernetics etc. To improve the profitability and image of the Railways, research will need to be undertaken in all these and many other areas.

5.3. *Heavier freight trains.* To contain capital inputs for meeting the needs of increased traffic, it would be necessary to run heavier freight trains on the high-

density routes. Introduction of these heavier trains would require an integrated approach, embracing improvements in motive power, wagons, signalling, track, bridges, terminals, etc. The question, for instance, whether it would be desirable to segregate freight lines from the passenger lines in certain heavy density areas would also have to be examined, as the introduction of heavier freight trains might cause practical difficulties on certain routes as far as line capacity is concerned by giving rise to problems for crossing or overtaking.

5.4. *Brake technology.*—The safe and efficient running of railway trains is, to a large extent, dependent on the reliability and efficiency of the brake system. This assumes greater importance as trains become faster, heavier and longer. Vacuum brakes still largely continue to be in vogue on the Railways. In spite of effecting many improvements during the last two decades, the vacuum brake system has been found to have basic limitations in hauling long freight trains. Similarly, the vacuum brake system imposes severe limitations for increase of operating speeds of passenger trains.

5.5. In the context of running heavier and longer freight trains, as also the progressive increase in the load of fast passenger trains, Railways will have to implement a phased programme of change-over to compressed air brake system. A beginning has already been made in this direction by switching over to this system for the Bombay Rajdhani express, as also by going in for air brake system for the proposed BOXN wagons. Considerable research and testing will have to be undertaken by RDSO for spearheading the introduction of the air brake system for both passenger and freight trains in a big way and to continually update and improve their performance.

5.6. *Metre gauge system.*—The metre gauge constitutes nearly 40 percent of the total route kilometrage and its performance has suffered due to its neglect in the past. As already brought out in Part II of our Report on Transportation, the metre gauge system would continue to exist in the foreseeable future. Improvements in the quality of service and economy in operations of the metre gauge would, therefore, be necessary. This would call for R and D inputs to improve the standard of metre gauge services. Improvements in speeds of both passenger and freight trains, better locomotives, heavier trailing loads for freight trains, mechanisation of transshipment facilities, containerisation etc., will have to be undertaken.

5.7. In this connection, the recommendation of the Committee on Metre Gauge Operations, appointed by the Railway Board, which submitted its Report in May, 1979, contains many useful recommendations. R and D inputs for implementing these recommendations should be initiated.

5.8. *Permanent way.*—To obtain optimal benefits the design and performance of the various components of track structure have to be constantly improved. This would involve R and D inputs in the following areas :

- 1 Wear and corrosion resistant rails.
- 2 Special rail sections for Crossings and Switches.
- 3 New economical designs for elastic fastenings.
- 4 Designs for ballastless track.
- 5 Development of techniques for handling and transporting long welded rails.



6. Improved techniques of site welding of rails requiring reduced time of operation and ensuring better quality.
7. Track structure requiring substantially reduced maintenance for use on sections of high speeds and heavy density where adequate time for maintenance is just not available.
8. New designs of turn-outs with higher speed potentials upto 100 km./h etc.

5.9. **Bridges.**—A large part of the railway bridge construction in the country had been completed prior to 1903 when the standards of loading for bridges were much lighter than those at present. The use of cement mortar was not in vogue at that time, and, therefore, the masonry in the bridges built during this period was mainly of brick and stone in lime mortar. The present day traffic density, axle loads and speeds are much higher, and thus we have a difficult situation in that while the bridges are ageing with the passage of time and are deteriorating due to the weathering, corrosion and fatigue etc., they are being subjected to increased loads, speeds and traffic density.

5.10. Research and investigation for developing improved bridge maintenance and preservation techniques, therefore, deserve very high priority. R and D efforts would be needed in areas such as 'fatigue life' of early steel and wrought iron girders, effects of laying long welded rails on girder bridges, dynamic analysis of bridge super-structures and sub-structures under seismic forces, impact effects on bridge sub-structures, development of economic designs of long span bridges etc.

5.11. A large number of bridges on busy routes are required to be rebuilt every year. Due to the inadequacy of traffic blocks, the bridge rebuilding programme often suffers. Research, therefore, needs to be conducted in devising improved methods of bridge building which would require traffic blocks of lesser duration. In coordination with Traffic Research Directorate optimisation of traffic blocks for renewal and replacement works should also be explored.

5.12. **Freight stock.**—In the context of meeting the phenomenal growth in freight traffic, accelerated technological inputs for the design development of wagons assumes importance. The new designs to be evolved must, *inter alia*, provide a higher payload to tare ratio, better utilisation of permissible track loading density, low initial cost, reliability in service, ease of maintenance, higher speed potential, features to prevent pilferage, light-weight construction, adequate structural strength and facility for mechanised loading and unloading.

5.13. Special purpose wagons for over-sized consignments, pelletised traffic and sliding roof wagons facilitating loading/unloading by crane should also receive attention. Bogies with improved suspension for better riding quality and greater stability would need to be developed. The evolution of designs of dedicated wagons for bulk movement of foodgrains, cement and fertiliser with necessary loading and discharging facilities would also be needed.

5.14. **Coaching stock.**—The present design of coaches incorporates many useful features such as anti-telescopic constructions which afford safety in accidents, all-coil springs to provide improved riding comfort and all steel all-welded body to increase the payload-tare ratio. With a view to improve the amenities and to

control the problem of noise and dust, fully air-conditioned coaches for sitting and sleeping accommodation in certain trains have also been introduced. Since air-conditioning is expensive, this facility has been extended only to a limited extent.

5.15. Keeping in view the projected increase in passenger traffic, the need for continuous improvement in the design of coaches particularly in the area of providing amenities and reducing discomfort to passengers need to be pursued. Continuous R and D efforts would be needed for improving the riding quality of the coaches, towards noise control and dust prevention, for development of cheap and effective airconditioning methods etc. Studies will also be needed for ergonomic improvements of seats and berths in coaches especially for long distance journeys.

5.16. R and D efforts for corrosion resistance, developing aero-dynamic Profiles to reduce wind resistance, tilting bodies etc. would be needed to catch up with the developed countries. Improved designs for inter-city multiple units both for electric and diesel traction to cope with the increasing suburban traffic in future would have to be evolved.

5.17. **Battery-cum-electric locos.**—R and D inputs would be required for evolving a suitable design of a battery-cum-electric loco on electrified routes for shunting on sidings which are not provided with overhead electric traction wires.

5.18. **Passenger terminals.**—With the continuous increase in passenger traffic, more and more passenger trains would have to be introduced. The number of coaches in these trains would also have to be increased. Presently, 2,217 passenger trains are running daily on the Indian Railways. The existing passenger terminals in the metropolitan cities are already becoming congested and are not able to cope with the number of passengers required to be handled at peak hours. New concepts for the design of passenger terminals would have to be evolved. This will require a multi-disciplinary approach to the problem involving experts in transportation, engineering, architecture etc.

5.19. **Mechanisation of yards.**—Research and investigations will have to be undertaken for mechanisation of marshalling yards with a view to reduce detentions and damages to the rolling stock. There are, at present, several systems which are being adopted for mechanisation of yards. These systems need to be studied in detail to know which of them, after modifications and improvements as necessary, would be most economical and operationally efficient for the working conditions in our yards.

5.20. **Signalling and Telecommunications.**—For dealing with the increased traffic, the Railways should give preference to making full use of the existing assets over additional line capacity works. In this context modern signalling techniques should have priority for optimum utilisation of the existing assets as it may reduce the need for large-scale investments on track and rolling stock. It would, therefore, be necessary to carry out research in the following areas :

1. Application of modern aids to signalling for increasing the line capacity and throughput. This would involve R and D efforts in the areas of axle counters, last vehicle check device, train describers etc.



2. Improvement in signalling equipment and systems to permit higher speeds. These would be in the sphere of automatic warning and cab signalling system, hot axle box detection etc.
3. Improvements required for signalling and safety. These would involve R and D efforts in the areas of track circuiting, development of electronic interlocking, automatic level crossing protection system etc.
4. Improvement of communication systems as efficient and reliable communication systems are necessary adjuncts for smooth operations. In this context, research and development directed towards strengthening the existing communication systems as well as development of newer concepts are of importance.

5.21. **Environmental pollution.**---While in India, pollution has not yet reached alarming proportions, except in some congested areas, it would be necessary to look ahead and plan for control of toxic emissions and effective disposal of effluents. As a major public sector industry with a wide geographical jurisdiction, heavy responsibility devolves on the Indian Railways for undertaking pioneering effort in regard to control of pollution.

5.22. In the Railways, majority of the pollutants are caused by combustion processes of steam and diesel locos, workshops etc. It would be necessary to undertake R and D efforts to determine the nature and amount of emissions from the locos and workshops to qualitatively and quantitatively determine their effects on the environment and to design and develop procedures and devices for their control.

#### 6.0. Conclusions.

6.1. Availability of the latest equipment and laboratory facilities is essential for the conduct of R and D. R and D institutions of the Railway Systems abroad invariably possess sophisticated equipment and ultra modern testing facilities. R and D activities of RDSO are, however, suffering because most of the equipment and laboratory facilities are either obsolete or inadequate.

6.2. In order to enable RDSO to effectively perform the role assigned to it, equipment and laboratory facilities will have to be modernised.

6.3. RDSO lacks certain essential facilities. These include a Computer Centre, a Captive Test Track, an OHE Recording-cum-Research Car, a Vehicle Dynamics

Roller Test Rig and a modern Electronics Laboratory. These facilities should be provided urgently.

6.4. Following important testing facilities for carriages & wagons are presently not available at RDSO: Suspension Testing Machine, Axle Box/Roller Bearing Testing Rig, Wheel Set Testing Machine, Compression & Tension Bench, Vibration Testing Unit, Rotating Testing Rig and Torsional Rigidity Measuring Rig. Early action to procure these equipment should be initiated.

6.5. Testing facilities in Track Components Laboratory need to be augmented for measuring and recording dynamic strains, displacements and accelerations.

6.6. Additional equipment is required to be provided in Rock Mechanics Laboratory for undertaking investigations in problems of tunnelling, land-slides etc.

6.7. Library and documentation facilities at RDSO are inadequate. To enable RDSO to act as an observation post for the advancements taking place in the Railway Systems of developed countries, the library and documentation facilities would require to be considerably expanded.

6.8. Adequate funds have to be allotted annually for procurement of latest technical books and literature for the library.

6.9. Facilities for translation from foreign languages viz., Japanese, French, German and Russian, need to be set up.

6.10. A computer package for documenting and storing information and its retrieval is also considered necessary.

6.11. The Railways have been allotting inadequate funds for R and D. As a result, RDSO has not been able to undertake many important R and D projects. Funds for R and D would have to be considerably stepped up.

6.12. Some of the important areas in which the Railways should direct their R and D efforts are: unit trains for carrying bulk commodities; improvement in the utilisation of rolling stock; increase in the average speeds of goods trains; reduction in detentions in marshalling yards and terminals, introduction of heavier freight trains; improvements in brake technology; metre gauge system; improvement of passenger and freight terminal designs; evolution of improved track structure; improved bridge designs; development of a battery-cum-electric loco; improved system of signalling and telecommunications; and evolution of measures for controlling pollution from locos and workshops.



## CHAPTER VII

### RESEARCH CENTRES

#### 1.0. Introduction.

1.1. We have already indicated in Chapters II and III that RDSO's record in research work involving development of modern indigenous technology is not worth the name. Besides, this Organisation has also failed to update or uprate even the imported technology. Apart from designs and standardisation activities where some creditable work has been done, the only achievements that this Organisation has are perhaps in the field of adaptation of imported technology to suit Indian conditions.

1.2. Consequently, though the Railways have succeeded in meeting through indigenous sources their requirements of locomotives, carriages, wagons, signalling and telecommunication equipment, track components etc., they have failed to keep abreast of technological advancements sweeping over the developed countries. This point was repeatedly emphasised during the course of the evidence given by numerous experts before this Committee. It has been their unanimous opinion that in most areas of railway technology India was almost 20-25 years behind the advanced countries.

1.3. In view of the prolific growth in rail-borne traffic by 2000 AD\*, it is essential for the Indian Railways to speedily close this technology gap. This would involve development of strategies for achievement of both short and long-term goals. The short-term goals would include optimum utilisation of the existing assets, increasing their performance and service reliability, evolving improved procedures and practices for achieving maximum cost-effectiveness in all areas of railway operations etc. The long-term objectives would be geared to the development of advanced generation of locomotives and other railway equipment by exploiting the possibilities offered by the latest developments in the fields of science and technology.

1.4. The facilities for the short-term have to be built around the nucleus already available with the Indian Railways in the shape of RDSO. In this regard we have already recommended in the preceding chapter some of the areas in which the Railways' R and D efforts have to be directed.

1.5. For the longer term, new Research Centres for Advanced Railway Technology would need to be set up. Setting up of these Centres has been considered necessary as the infrastructural facilities and the manpower required for development of modern technology do not exist in RDSO. Further, we are not in favour of strengthening RDSO for taking up the task of developing advanced generation of locomotives and other equipment as that would make this Organisation unwieldy and cumbersome for effective control and management. It would also require completely different quality of equipment and personnel; and an altogether different psychology, approach and culture.

1.6. There is a school of thought which favours that we should not import technology but try to develop the same indigenously. In our view such an approach would prove self-defeating, as it would force our R and D institutions to keep on re-inventing the wheel while the developed countries continue to acquire more and more advanced technology and the gap would go on increasing. We, therefore, consider that there should be no hesitation in importing the latest technology in the areas where we lack it. As a matter of fact we positively recommend that this should in actual practice be unhesitatingly done.

1.7. The advanced technology that we need today is, no doubt, available with the transnational-companies in the developed countries. These companies are, however, reluctant to part with their latest technology because it is this technology which is keeping them ahead of us. As a result, the imported know-how is often not the very latest but outmoded by two or three years and more. To overcome this handicap we have to develop a strong R and D infrastructure and manpower of the requisite calibre from within the country and even from abroad; this would help not only to improve upon the imported technology, but would also help to undertake the task of evolving indigenous modern technology. We have thought of the Research Centres for Advanced Railway Technology, *inter alia*, to achieve this vital objective.

#### 2.0. Role and set-up

2.1. The proposed Research Centres for Advanced Railway Technology would be charged with the task of developing advanced, generations of locomotives and other railway equipment. Since development of new designs is a long-lead process, often spread over periods of 5 to 15 years, even in the developed countries, it will have to be ensured that the parameters of designs taken in hand reflect the requirements that would mature after this period. Accordingly it would be necessary to establish a suitable machinery preferably in the Railway Board, that would lay down the requisite design parameters for these equipment.

2.2. These research centres will be independent of RDSO, but will maintain close liaison with it. They will be provided with the most modern and sophisticated facilities and equipment. Such of the laboratory and testing facilities which already exist at RDSO need not be duplicated at these Centres. Instead, these Centres will utilise these facilities at RDSO. These Centres will also maintain links with other leading R and D institutions of the country and abroad, and arrange to make liberal use of their expertise and facilities under bilateral or multilateral covenants. This would enable them to get exposed to the latest developments taking place any-where in areas of interest to them.

\* Cf. para 2.2



2.3. These Research Centres should be compact highly geared units with unified technical and administrative control. Each of these centres should handle only a limited number of specific projects at a time, and should not be burdened with other extraneous works. This is necessary because very often institutions encompassing a wide variety of activities gradually petrify into large bureaucracy-ridden organisations. The problem of administering such institutions then tends to get complicated due to vested interests which, gradually develop over a period of time. It is, therefore, necessary to set up only small compact Research Centres with a project-oriented approach, based on well-defined goals.

2.4. It is not necessary that these research centres should be located at the RDSO, Lucknow. They can more conveniently be located at places where national research laboratories and other institutions having facilities in the related fields exist, and if no such location is possible, then not far from the factories where the same or allied items are manufactured.

### 3.0. Manpower.

3.1. Each Research Centre should be headed by a Director-General, and manned by hand-picked technologists, scientists, transportation experts and technicians. Manning of these Centres by experts in more than one discipline is considered necessary, because for the development of new equipment, a systems approach is essential wherein all the related aspects of a problem are simultaneously studied in depth. Such an approach avoids disjointed efforts being made; as otherwise lack of progress even in one area holds up the successful completion of the project as a whole.

3.2. Extreme care will have to be exercised in the staffing of these Research Centres. Unlike RDSO in whose case we have recommended that majority of the manpower should be drawn from the Railways, these Centres should have a separate cadre of their own. We consider this course of action necessary as the main task of these Centres would be the development of new technologies, a long-lead process often spread over 5 to 15 years. Fittest and brightest men available anywhere, whether in the Railways, in other research institutions, in universities, or even in the private industry, should be picked up for manning these Centres.

3.3. In the areas where indigenous experts are not available there should not be any hesitation in recruiting them even from foreign countries, Indians or foreigners, if necessary on special terms. In our view, experience in railway technology should not be essential for majority of the personnel manning these centres. Some of the posts would in any case have to be filled in by eminent scientists, mathematicians and other experts in the related fields.

3.4. In order to attract first-rate technologists, scientists and other experts to these Research Centres, it would be necessary to provide attractive emoluments, promotional prospects and working conditions for the personnel working in these Centres. A pedestrian or mundane attitude will be extremely deleterious. We recommend that the designations, pay scales, recruitment and personnel policies, working environment etc. in these centres should be patterned on the basis of reputed R and D institutions like the ISRO\* and BARC. †

3.5. If some of the technical personnel employed in RDSO show outstanding achievements and aptitude for higher research and also possess the requisite academic and technical qualifications, there should be no objection for considering such exceptional individuals for utilising their services in the Research Centres.

3.6. Directors-General of these Centres also need not be railwaymen; they should be eminent technologists or scientists from India or abroad with proven background of R and D management. We recommend that greatest care and caution is exercised in their selection because, on their vision, judgment and performance would depend the benefits or otherwise of the investments that will go into these Centres.

### 4.0. Review of work.

4.1. Planning for each research project entrusted to these Centres would have to be meticulous, with clear objectives, estimation of funds needed for achieving the project goals, manpower, equipment, foreign exchange requirements etc. being foreseen as accurately as possible at the initial stage itself. These projects would have to be scrutinised thoroughly right in the beginning, and care should be exercised not to venture into open-ended projects, without clear objectives and goals in the name of carrying out research in some specific fields.

4.2. A periodical review, say once a year, should be carried out at the highest level on the functioning of these Centres in order to ensure that the projects entrusted to them progress on the desired lines. This review would have to be hard-hearted and in case it is found that the projects are not proceeding on the desired lines, or the project personnel are not likely to produce the results envisaged, there should be no hesitation in adopting harsh corrective measures; and when they are proceeding right lines and showing good progress they should receive positive encouragement.

### 5.0. Suggested Research Centres.

5.1. To begin with, we recommend the setting up of three Research Centres for developing advanced technology in the following areas :

1. Electric traction
2. Diesel traction
3. Control, communications and cybernetics.

### 6.0. Research Centre for Electric Traction.

6.1. On the Indian Railways DC electric traction was introduced during the Twenties. Subsequently in the Fifties, 25 KV AC traction was introduced and upto the end of March, 1982, the Indian Railways have electrified 5,475 route kilometres. Electrification of the trunk routes on a very extensive scale has been proposed during the Sixth Five Year Plan period and beyond : it is envisaged to electrify 2,800 route kilometres in the Sixth Plan and for electrification of 5,000 route kilometres during the Seventh Plan.‡

6.2. The present indigenous production of electric rolling stock and traction equipment etc., is based on the technological inputs obtained from foreign countries in the Sixties. Considerable advancements in electric

\* Indian Space Research Organisation, Bangalore.

† Bhabha Atomic Research Centre, Bombay.

‡ We have recommended in Part II of our Report that Indian Railways should forthwith adopt a programme of accelerated electrification of trunk routes and mineral belts.



traction have, however, taken place elsewhere in the world, leaving the technology level of our Railways far behind. Research and developments will, therefore, have to be undertaken to update the electric locomotives and other electric traction equipment. The areas in which R and D should be pursued by the Indian Railways are :

1. *Electric locomotive.* Electric locomotive technology should be modernised with increase not merely in the horse-power of locomotives but also adhesion, through the use of modern control systems based on thyristors/choppers. To begin with, designs of electric locomotives should be evolved which are capable of hauling 22 coach trains at speeds up to 160 km/h with potential for further increase in speeds. For freight trains separate designs of locos suitable for hauling trailing loads of 4,500/7,500 tonnes or even higher on gradients upto 1 in 200 should be evolved.
2. *Overhead equipment (OHE).* This would include research for replacement of copper wires by aluminium ones, upgrading the designs of other miscellaneous equipment such as pantographs, boosters, transformers, interruptors, section insulators, lighting arrestors etc.
3. *Other important areas.* Research in miscellaneous areas such as synchronised operation of locomotives interspersed in a 7,500 tonne or heavier freight train, tapping power from the OHE for train lighting and air-conditioning, research for operating electric traction systems including EMUs in the most economical & efficient manner from the point of view of energy consumption, maintenance expenditure and throughput, development of electric train sets etc., will have to be undertaken.

#### 7.0. Research Centre for Diesel Traction.

7.1. Diesel traction was introduced on the Indian Railways in 1957 and has since been gradually extended over a large number of busy routes, particularly for hauling freight and express/mail trains. During 1981-82, diesel traction accounted for 62 percent of the passenger train kilometres and 65.4 percent of the gross tonne kilometres carried by the Indian Railways. Diesel locomotives today account for about 9 percent of the total diesel oil consumed by the country, the main consumer of this oil being road transport, which accounts for nearly 80 percent of the total consumption. The Railways are a more efficient user of diesel oil than the road transport particularly for long hauls; as per the annual report of the Indian Railways 1981-82, they have at least six to one advantage over road transport in terms of fuel consumption.

7.2. The diesel engine technology acquired by the Indian Railways has now become more than 20 years old, as we have not kept pace with the continuous developments made elsewhere in this field. Consequent on the steep increases in oil prices in the last two decades, research and development efforts have been made all over the world to optimise utilisation of petroleum products. Many remarkable achievements have been made by the various diesel engine manufacturers in increasing the efficiency and in reducing the fuel consumption of these engines.

7.3. The projected electrification of the broad gauge trunk routes would take several years for completion.

Even after that, diesel traction will be predominant on the less busy main lines and branch lines on BG as well as main and branch lines on MG.

7.4. It is, therefore, essential to carry out intensive research work for development of more fuel-efficient diesel engines. It will also be necessary to evolve designs for high-power diesel locos for both passenger and freight traffic for use on the non-electrified main line sections. It is, therefore, recommended that the proposed Research Centre for Diesel Traction should under-take research on the following major projects :

1. Optimisation of existing designs for diesel engines for increasing their efficiency and reducing fuel consumption.
2. Development of new designs of high horse power diesel locomotives, separately for passenger and freight traffic. In this context, we have already indicated in Part II of our Report on Transportation the broad directions for development of BG and MG main lines and shunting locomotives.
3. This Centre should also take up development of new designs suitable for cheaper and easily available alternative fuels in place of diesel oil.

7.5. A Diesel Engine Development Organisation (DEDO) has been sanctioned for RDSO. One the proposed Research Centre for Diesel Traction is set up there would be no need for setting up this Organisation at RDSO. The Railways should, therefore, hasten to set up the proposed Research Centre.

#### 8.0. Research Centre for Control, Communication and Cybernetics.

8.1. This Research Centre will carry out longterm research in signalling and telecommunications, cybernetics and computer applications for meeting the needs of railway operations for 2000 AD and beyond. Signalling and telecommunications have played a vital role in improving efficiency of operations and optimising utilisation of assets. Recently cybernetic techniques have come to be accepted as useful aids in train operation. Computers have become important management tools with immense scope in the field of train operation and control.

8.2. Research and development efforts in the field of signalling will have to be geared to improving the line capacity and throughput of the various routes, increasing the speeds of trains, achieving higher standards of safety in train operations etc.

8.3. Railway communications are undergoing revolutionary changes in the developed countries through increasing use of semi-conductor technology, fibre optics, digital data communication techniques etc. Our Railways will also have to make use of these technologies to make communication system which is a necessary adjunct of smooth train operations, more reliable and efficient. This would include research and development efforts in fields such as establishing reliable communications between the guard and the driver, between the running train and the stations, in the marshalling yards and terminals etc.

8.4. In the field of cybernetics, considerable amount of work has been done in the application of process control computer used in the traffic control system. For



example, these railway systems now utilise computers to check the field conditions in large yards to determine favourable routes through extremely complicated and often congested series of turn-outs and cross-overs. After determining that the conditions at site are favourable, a computer can generate commands for positioning of points and crossings to establish preferential route for train movement. Some of the foreign railway systems have achieved remarkable progress in the use of cybernetics. For example, some of them plan in the future to operate trains over the entire system controlled completely by computers which will despatch trains, arrange crossings, control headway between trains, stop and start trains as necessary.

8.5. The Railways are planning to procure a computer system for efficient management of their wagon fleet. Apart from this, there are many areas like invoicing, billing, accounting, passenger reservations, maintenance scheduling etc. where computers would find an increasing use on the Railways. For this purpose, the Railways would have to maintain a network of computers. This network would also provide the requisite management information support to the Zonal Railways and the Railway Board.

8.6. In this Centre there should be a hard core of distinguished transportation experts and signal, communication and computer (both hardware and software) engineers of proven merit and demonstrated brilliance, to undertake the tasks indicated above.

#### 9.0. Conclusions.

9.1. The technology gap between the Indian Railways and the advanced railway systems has been widening fast over the years. To reduce and close this gap the Railways will have to undertake research projects of both short and long-term perspective. The short-term research projects would be undertaken by RDSO and would be in the spheres of improving the efficiency and reliability of the existing equipment, for evolving procedures and practices for achieving greater cost-effectiveness in all areas of railway activities. The long-term objective would be the development of designs of advanced generations of rolling stock and other railway equipment. For achieving this objective, Research Centres for Advanced Railway Technology would have to be set up.

9.2. There should be no hesitation in importing technology from the developed countries. The Research Centres for Advanced Railway Technology would assist in their own spheres not only in absorbing and indigenising the imported technology, but also in improving upon it. Since development of advanced generations of the equipment is a long-lead process, design parameters of these equipment will have to be very carefully drawn up so as to meet the requirements which will mature by the end of the targetted period.

9.3. The research centres would be independent of RDSO, but will utilise the laboratory and other infrastructural facilities already available there. They will maintain close liaison with RDSO and other research institutions within the country and abroad and should liberally use their expertise and facilities under bilateral multilateral covenants.

9.4. Unlike RDSO, these Research Centres will have a separate cadre for their manpower. To attract the best possible manpower to these Centres, from within or outside the Railways, from India or abroad, generous emoluments, promotional prospects etc. should be devised for the personnel of these Research Centres. These Centres should be modelled on the pattern of successful Research and Development institution like ISRO and BARC.

9.5. Director General of each of these Centres should be drafted from among distinguished scientists or technologists with proven record of R and D management, and need not be railwaymen and can be from India or abroad.

9.6. A limited number of Research projects should be entrusted to these Research Centres. A periodic review of the projects assigned to each Research Centre should be carried out to ensure that they are progressing on the right lines and corrective measures taken wherever necessary.

9.7. To begin with, we recommend setting up of three Research Centres to undertake research and development projects on :

1. Electric Traction
2. Diesel Traction
3. Control Communication and Cybernetics.



## CHAPTER VIII

### THE ROLE OF RAILWAY BOARD

#### 1.0. Introduction.

1.1. With regard to the performance of RDSO, and the charge that it has failed to update or uprate even the imported technology, we feel that the blame cannot be put on RDSO alone. The Railway Board have also to largely share the responsibility for this state of affairs, since they have neither given RDSO the basic policy directions, nor have they made available sufficient resources for R and D. In fact their approach appears have been hamstrung with routine and a lack of vision and perspicacity.

1.2. RDSO has not been provided help by the Board for the streamlining of its various functions and procedures for enabling it to utilise even the meagre resources allotted, of which paradoxically portions had to be surrendered now and then. We understand that on many occasions, Director-General of RDSO was not given the freedom even to pick up competent Officers from the Railways for deputation to RDSO.

1.3. The Railway Board in the final analysis have taken little interest in R and D activities. As a result there has been no real long-term planning and bulk of the work assigned to RDSO has been of a 'firefighting' nature.

#### 2.0. Railway Board and R and D.

2.1. At present, Member Engineering, Railway Board, is in overall charge of RDSO at the level of the Railway Board. The duties of Member Engineering are so multifarious that it is impossible for him to devote adequate attention to the functioning of this organisation. This situation is likely to further worsen when the proposed Research Centres for Advanced Railway Technology are also set up. There is thus an obvious need to evolve an arrangement under which necessary attention and support at the Board's level can be bestowed on the Railway's R and D activities.

2.2. The purpose behind the R and D activities of any organisation has to be the achievement of its goals the most efficient and economic manner and within the targetted period. All R and D projects have, therefore, to be tailored to achieve the objectives set out in the Corporate Plan of the organisation. On the Indian Railways, the Planning Directorate of the Railway Board is responsible for all the Planning activities including the formulation of the Corporate Plan. This Directorate is presently working under Chairman, Railway Board. In view of the close nexus between R and D and planning activities, we consider it necessary that these two functions are put under the charge of one individual in the Railway Board.

2.3. There will be a prolific increase in the traffic to be handled by 2000 AD. Unless the Railways modernise the technology and operational practices, the capital investments needed for the acquisition of additional assets and the recurring expenditure on the increased manpower to cope with this traffic would be very large and beyond the reach of the Railways. The Railways have, therefore, no option but to update their technology

and operational practices, with a view to carrying the increased traffic with the minimum investments on additional assets and also with the least possible increase in manpower.

2.4. For this purpose, it is necessary that planning and R and D activities should get fullest attention at the level of the Railway Board and that there is a combined and coordinated perspective for both. This cannot be achieved in the present disjointed arrangements under which neither gets satisfactory for adequate attention.

#### 3.0 Central Board of Railway Research (CBRR).

3.1. At present the research and development activities of RDSO are supposed to be based on the guidelines laid down by CBRR. This Board has 24 members including its Chairman. It is headed by CRB and includes Members of the Railway Board, Director-General, RDSO, in addition to scientists, technologists, managers and senior executives drawn from both the Indian Railways and research organisations and industries. CBRR is assisted in its work by four Sub-committees for different disciplines, one each for mechanical and electrical engineering, civil engineering, metallurgical and chemical engineering, and signal and telecommunication engineering.

3.2. The objective behind the setting up of CBRR was to produce greater efficiency in railway research by allocation of priorities for research problems, by coordination with other Research Institutes to avoid duplication of efforts and to benefit by their work and finally to bring the knowledge of the highest body of available research workers to bear on the solution of the urgent railways technical problems.

3.3. CBRR, however, meets once a year for two or three hours and that too at Delhi and usually endorses the Report on R and D prepared by RDSO. Further, quite often most of the scientists and technologists do not attend the meetings in person, but instead depute their juniors, who may not at all have the perspective. We have seen minutes of a number of such meetings. The minutes of the last meeting of the CBRR are given in Annexure A.8.1 A perusal of these minutes also clearly shows that a major portion of the item is devoted to speeches; the discussions on the Railways R and D problems appear to be comparatively short and cursory.

3.4. This aspect of the functioning of CBRR was also commented upon by the Study Team on the Railways of the Administrative Reforms Commission (ARC) which submitted its Report in November 1968 :

"We have seen the minutes of some of its meetings. We are constrained to remark that there has been a gradual falling off in the attendance of outside members and often only representatives who are not high-up in the profession are sent. On the whole the deliberations of CBRR lead us to suggest that its working and that of its Sub-committees, should be revitalised."



3.5. In our view, CBRR should be an appropriate forum where eminent scientists and technologists can freely express their opinions and indicate the directions in which the R and D efforts of the Railways need to be channelised. If CBRR has not been serving the objectives for which it was originally constituted, what is needed is its revitalisation in some form.

#### 4.0. R and D and CBRR : revitalisation.

4.1. It is essential to revitalise the composition and functioning of CBRR on the one hand, and to take a decision for the revitalisation of the control and supervision over R and D at the highest level, on the other.

4.2. As for CBRR, we recommend the following :

1. It should meet more frequently at least twice a year, either in RDSO or in one of the three Research Centres.
2. In the discussions, CBRR should eschew the speeches and get down to their business in a professional manner.
3. It should be made much more compact and should have less of (ex-officio) executives and more of scientists, technologists or experts in rail transportation.
4. The outside members should not exceed six, and may among others be drawn from National Research Institutions, Institutes of Technology, Universities and Industry engaged in the manufacture of sophisticated rail equipment.
5. They should be appointed not in their official but in their personal capacity.
6. From the Railways, Directors-General, RDSO and the Research Centres should inter alia be members of CBRR.
7. The agenda should be strictly in terms of the progress of specific projects undertaken and the programme of projects required to be undertaken.

4.3. As to how exactly the fuller and coordinated attention at the highest echelon on Planning and R and D should be arranged, is a matter for in-depth scrutiny. The Committee, therefore, would give their recommendations on supervision and control of these activities at the highest echelon in a later Report on 'Organisation'.

#### 5.0. Conclusions.

5.1. With regard to the Railway's failure in updating or uprating the imported technology, the blame cannot be entirely put on RDSO; the Railway Board have also to largely share it.

5.2. A prolific increase is expected in the traffic to be carried by the Indian Railways in the next two decades. If the Railways continue to rely on the outmoded locomotives and other equipment, the investments needed on the acquisition of additional assets to handle this increased traffic would be very heavy and beyond reach. Besides, the Railways will also have to increase their manpower considerably.

5.3. To minimise the investments on additional assets and to check the runaway growth in manpower, the Railways will have to accord high priority to Planning

and R and D activities. Such an approach is essential for modernising the railway system and improving the productivity of assets and manpower.

5.4. It is necessary that the Planning and R and D functions which are crucial to the modernisation and development of the railway system in effectively grappling with the projected growth in traffic, do receive fuller attention than at present.

5.5. It cannot be said that CBRR is at present functioning either in a professional or in a business-like manner. Neither is its composition compact, nor are its deliberations pragmatic or imaginative.

5.6. There is need for revitalisation of both CBRR and the control over R and D and Planning at the level of the Railway Board.

5.7. As for CBRR, we have made specific recommendations for its revitalisation.

5.8. As to how exactly fuller & coordinated attention to Planning and R and D at the highest echelon should be arranged is a matter for in-depth scrutiny. Specific recommendations for supervision & control of these activities at the highest echelon will be made later in our Report on 'Organisation'.

*Annexure A. 8.1*

*(Cf. Para 3.3)*

#### Minutes of the Nineteenth Meeting of CBRR held on 16th August, 1982.

##### 1. Inaugural Address by Shri P.C. Sethi, Hon' ble Minister for Railways.—

Distinguished Scientists, Chairman, Railway Board, Mr. Gujral, Members of the Board, and my colleagues in the Railways and Friends,

It is a matter of immense pleasure for me to be amongst you to inaugurate the 19th Meeting of the Central Board of Railway Research. I feel particularly happy to find many eminent scientists, leaders of industries and educationists attending this meeting to participate and review the research and development work done on Indian Railways.

I hope the deliberations of this Board would contribute to the development of Indian Railways at a time when we need the advice most. After achieving record freight movement of 220 million tonnes during 1981-82 we are facing a challenge to move double the quantum of traffic within this decade and treble it by the turn of the century. It can be appreciated that this colossal task will require a basic transformation in our methods and approach in developing the requisite transport capacity. While additional inputs by way of additional facilities will, no doubt, be required the critical factor will be the inescapable need to optimise utilisation of our assets.

Undoubtedly in the years to come, technology will have a great influence on all our activities in meeting the formidable challenge of securing a more comfortable and purposeful life for our people. With an estimated population of 1000 million by the end of the century the impact of the same, particularly on transportation sector amongst other things, will be a formidable one. With a 66.5 billion passenger kilometres (B.P.K.) in 1950-51, the passenger traffic has increased



to 200 B.P.K. in 1981-82 and a conservative forecast is that by the turn of the century the burden would be 525 B.P.K. The growing population and their aspiration for a higher standard of travel will pose many serious problems. The solution perhaps lies in technological innovations.

One of the major problems facing the railways is the necessity and urgency of replacement and renewal of the aged assets. It is estimated that during the 6th Five Year Plan period 1000 locomotives, 65,000 wagons, 8,000 coaches, 27,000 Km. of track and about 80 to 90% of machinery will become due for replacement. As per the futuristic estimate of the Rail Tariff Enquiry Committee, Railways would require 11,000 crores of rupees calculated at 1977-78 price level against renewal and replacements requirement during the next two decades. In the Sixth Five Year Plan an outlay of Rs. 2,100 crores has been made towards this. To take this gigantic task, we will have to try our best to see that the available resources are utilised to the maximum extent possible and the research and developmental activities should necessarily be oriented in this direction to see how this can be achieved.

I would like to bring some of the major technical achievements of Indian Railways to the notice of members in the field of maximisation of asset utilisation.

To meet the increasing demand of passenger traffic, we have introduced double-heading of Bombay-Delhi Rajdhani Express with air brakes and increasing the composition of the train from the existing 9 to 18 coaches at 120 Km/h speed. Augmentation of passenger transportation capacity in this prestigious train has been received by public with great enthusiasm. The introduction of the same posed a lot of challenging problems with regard to the innovative ways required for tackling the high level of forces generated in the draft and buffing gear under certain operating conditions, as also the problem of old substructure of bridges-particularly the Bassein Bridge-to bear the increased longitudinal forces imposed by the powerful braking system.

I am happy to inform the Committee that the Indian Railways have now entered the era of air brakes on the main line coaching trains with the introduction of Rajdhani Express on Bombay-Delhi route. It has been possible to run this longer train with the same existing braking distances because of the powerful air brakes. This has been made possible after sustained design developments in brake system of coaches and locomotives and investigations by RDSO into the air brake system to determine optimal parameters.

I must compliment the RDSO, ICF and Western Railway for achieving this objective very well.

Introduction of longer and heavier freight trains necessarily requires air brakes to keep the braking distances within acceptable limits and to have satisfactory control of the train by the driver as also to improve the general efficiency of operation. The new BOXN wagons are being fitted with air brakes.

All new locomotives to be manufactured at DLW and CLW will have dual brake system capable of functioning with trailing trains fitted with either the vacuum or air brakes. I am glad to know that RDSO has developed an indigenous dual brake system for application to electric locomotives. This has already been incorporated on 20 WAM4B locos which are now in service in K.K. line on the S.E. Railway.

Another aspect which has been receiving the attention of the Railway Ministry is 'energy conservation'. This is specially relevant under the present day energy crisis. Considerable amount of energy is being wasted in the starting resistors in the conventional control of the suburban trains. Development of the chopper control for EMU stock has been taken in hand and this equipment, when fully implemented, is likely to effect a saving in energy consumption of nearly 30%.

Indian Railways are also introducing thyristor control for electric locomotives to replace the conventional tap changer control. This is expected to reduce the maintenance and improve the rail-wheel adhesion on the locomotive.

As a measure of preparation to meet the future traffic requirements of branch lines, when the existing steam locos would no longer be available, RDSO has developed designs for 1400 medium HP BG branch line diesel electric locomotives. Two prototype locomotives of this type have been built and evaluation tests are being taken up shortly.

In the field of safety, signalling and telecommunication, RDSO has an important role to play. With the large scale installation of Axle Counters, the progress of track circuiting works has been accelerated. The indigenous development of Automatic Warning System has been completed and suitable measures have been devised to overcome theft of the equipments installed on the line. The menace of burglary and violence on running trains has brought in the need for providing communication in the running train and development work in this field needs to be taken up. Modernisation of signalling and tele-communication equipments to increase efficiency and economy is also being undertaken.

Involvement of human factor in railway accident has been engaging the attention of our Psychologists working in RDSO. Psychological tests evolved by them are finding increasingly expanding application in selection of safety personnel. These, have, however, to be supplemented by a more broad-based research, covering different facets of railway technology and the changes in man-machine configuration for better productivity, efficiency and safety.

Though we have been able to achieve around progress in various facets of the railway operations, we should not be complacent. Keeping in view our limited resources and the fact that we have to handle a phenomenally increased quantum of traffic with almost the same level of resources, we must have a long-term plan to evolve new designs of powerful locomotives and rolling stock fit for higher speeds.

We have also to take a closer look at our needs and acquire technology if necessary from outside. We have to have an open mind and innovative approach and look for new techniques and methods. Quite often we are bogged down with old designs and older equipments. Obsolescence of plant and machines is certainly something which we have to get over. To that extent, I feel convinced that we must not feel shy of importing technology wherever it is necessary.

Though RDSO is presently concentrating more on problems of operational priority with short and medium terms objectives and of interest to the Railway's day to day working, there is need to concentrate on long term objectives and develop required expertise for rational design of track and vehicle systems and their sub-systems. In this context, there is need to develop



additional facilities to conduct quality oriented applied research as also to have proper interaction with I.I.Ts and other leading Research Centres to keep abreast with the latest technology in the field. I look forward to this august body to interact and guide in this mammoth task. The Railway Reforms Committee are also looking into various facets of this problem and we will be getting their recommendations shortly.

Another important aspect, which I like to mention here is about afforestation. You all will be aware that for a proper ecological balance, afforestation is one of the most vital requirements. Railways have planned planting of 10 crores trees on either side of tracks and other places under their occupation. Of the 1.22 lakh hectares of vacant land 78,000 hectares would be utilised for afforestation and remaining 44,000 hectares for 'grow more food'. The planting of trees between two railway stations would be done by co-operation with the State Governments. In this connection Railway Board have recently set up a new directorate of Railway Land Resources Development.

It is only the application of the mind of scientists and technologists to the various problems that result in better quality research and development. The research of scientists never stops and they try to discover better and better methods all the time. Happiness of pursuit is the greatest happiness for the scientists. I am sure that the Railwaymen will also follow this pursuit.

From a perusal of the Agenda I see that RDSO have been doing very good work in solving problems of operational importance and providing fast solutions to meet the increasing demands of traffic and passenger comfort.

Gentlemen, with these words I inaugurate the 19th meeting of the Central Board of Railway Research. I once again thank you and wish that the Committee will have fruitful discussions.

## 2. Address by Chairman, Railway Board,

Hon'ble Minister for Railways, Distinguished Scientists and Scholars, my colleagues and Friends.

It is my privilege to welcome you to this gathering of the apex body of railway research. We are grateful to you, Sir, to have spared time to be with us and to have agreed to inaugurate the 19th meeting of the Central Board of Railway Research.

I don't think I will burden you with any homilies on the subject or with what RDSO has been doing over the year. I will like to confine myself to what my perception of the R & D effort on railways is and where we need to go, if we have to serve the interests of the economy and the community. RDSO is a premier research institution in the country and several countries look up to the work that is done there.

By its very nature, science and technology generate a spirit of impatience and discontentment with the present, a desire to change things a constant quest to harness nature and its infinite resources for the well-being of man. I look upon science and technology as mighty tools in the hands of man which has opened up vast vistas of limitless expectations. Scientific thought and temper has been an integral part of Indian culture. The Indian mind is innovative and ingenious. There are over 10,000 books and treatises written in India on science and technology over the six centuries-12th to the 18th.

We take pride that Indian today ranks among the first few nations in the world with a rich reservoir of scientific and technical expertise.

I am equally proud that, among the vast railway family in the country, we have very distinguished and very capable engineers and managers. There is a great deal of effort required to be put in for an *integrated systems approach to railway problems, and attempt to delve deep into* what railways need, what potential exists, and how efficiently and effectively we are able to design and standardise the hardware and practices for optimal gains.

Railways ushered in the industrial revolution in a way; they became the precursors of industrial growth and economic progress; they become a symbol of modern civilisation and artefacts; they became leaders of management in large organisations. Railways have remained the nation's arteries and a backbone of her economy. We have come a long way from those days of an antediluvian system we inherited in 1947. You are aware that today there is a renewed confidence all over in the capability of Indian Railways. Not only did they reverse the trend last year but have scaled unprecedented heights in the quantum of traffic they have carried and the productivity they have shown. After having carried a record quantity of freight and number of passengers last year, each individual month in this Productivity year has, again, been showing higher levels of traffic than ever before in the past in each corresponding month. The position today is that rail transport capacity is surplus and wagons of different types, in large numbers, are stabled in several yards we have closed down.

A large number of measures have been taken with a view to developing rail transport capacity on a long term basis. Whether it is quick phasing out of the steam locomotive, or closing down of yards, of transshipment points, or rationalised booking and clearance of goods at and from stations, train examination systems, integrated operation of trains, standardisation of passenger train formations, segregation of express streams of freight traffic, maintenance of track and rolling stock, it has been a constant endeavour on our part that we equip the system to serve the interests of the economy with the minimum strain on nation's resources.

We have taken decisions to go ahead with large scale electrification of rail tracks, designing of new sturdy and reliable wagon fleet, revamping of locomotives in addition to streamlining the operational procedures. All this has required the combined effort and dedication of railwaymen and officers of all disciplines. But, what remains to be done, what is required to be done is indeed immense.

We are conscious that Rajdhani which we run on broad gauge, the Pink City and the Vagai on the metre gauge are not enough by themselves. We have to look for some increases in speeds specially on the metre gauge. We are improving the quality of service on Rajdhani and improving on the schedule they follow, besides more than doubling the accommodation on them. The gains from introduction of these trains is not merely in the area of travelling time being reduced but, what is more important, in technical awareness which these higher speeds services have brought in their wake.

Metre gauge is a very important area which is of interest to several of the countries in our part of the world and they do look up to Indian Railways for



technological improvements. We need to make substantial improvements in freight and passenger services.

It is essential that we continue to upgrade our technology and share the fruits of it with other countries of the region. It requires multi-disciplinary research teams, working in an atmosphere of dedication and diligence. There has to be perfect coordination among them. I also realise that the R & D infrastructure has to be sufficiently broad-based; engineers and technicians have to be suitably trained up.

I feel convinced that we need to have our feet firmly planted on our soil; our training does not necessarily have to be oriented to what they do in the developed world; instead, in house training of engineers and technicians in mathematics and engineering disciplines in our situations will be practical step which RDSO should adopt and draw specialist from IITs and universities. Techniques of mathematical simulation and modelling are available in the country.

Sitting amidst eminent scientists and engineers as we are, let us share our views frankly. We have to have a completely new approach to our R & D effort. We need to reorient our staffing and training. RDSO has on its roll a large work force : Some 300 and more personnel in categories A & B : there are sanctions for more than 3,500 in categories C. & D. The budget estimates for the current year for the RDSO run into figure of more than 12 crores of rupees, although the Board have asked them to restrict the expenditure to around 9 crores only. It is not a small amount. Not that I wish to suggest that R & D is a commodity which can be obtained just for the asking. All I wish to say is that we have to channelise our activities in a right spirit, create congenial environment and recruit and train the right type individuals and make use of them to the best interests of the organisation. I am reminded of what the World Bank team pointed out to us the other day that we need to modernise the set up and practices, bring about effective coordination and integration among the different wings. We need to embark upon our schemes with a new attitude.

Indian Railways have very challenging tasks to perform. Cost is a very important element required to be kept in mind to pursue all our schemes. We have to design equipment which will be easy to maintain, inexpensive to maintain, equipment which will be reliable while in service and will help ensure safety in operation. The railroad bed and the mobile assets have to pass this crucial test. We saw in China that the maintenance of their assets if of such a higher order and failure of equipment while in service is almost unheard of. We have also to ensure that there is an integrated approach adopted towards designing of equipment. Material handling has to be reckoned as an important ingredient of our wagon fleet design features. Terminals have to be likewise developed.

There are other important areas. The rail-wheel interaction studies are important; riding characteristics of a vehicle depend not only on its suspension design but also on the quality of track geometry. These two functions have to be correlated and fully integrated. It calls for advanced knowledge in mathematics and usage of sophisticated software. Thumb rule methods will not do. The methods of monitoring track irregularities with high fidelity have to be adopted and efficient and economic track maintenance methods. It is necessary that the differential in the speed of freight and passenger trains is narrowed down. The measuring

of wheel technique is itself required to be developed. We have to evolve scientific methods for determining track renewal norms.

Running of longer and heavier trains will be an important feature of operations, running 7500 tonne goods trains and 22 coach fast express trains. It will need to be determined how optimal tractive effort can be obtained, what should be the balancing speeds on graded sections, the effect on doublings, what axle loads can and should be adopted for the rolling stock of the future in relation to the strength of bridges and track substructures, what should be the optimal diameter of the wheel and so on. Other areas requiring attention include evaluation of insulating material and insulating systems in traction machines, thyristor technology, design of OHE for better performance and reliability as well as economic installation, new designs of sleeve bearings for diesel engines and plain bearings on traction motors, even items like lubricants and paints. The very design of our new locomotive fleet has to receive urgent attention.

Energy has assumed high importance. We have to think in terms of new sources and methods to conserve energy. The hotel load for trains, for instance, for airconditioning and lighting, if derived from OHE, will help us save precious space on passenger trains which today carry dead load of even up to three generator vans on a Rajdhani.

There is almost a revolution brought about in the developed world and technology has been advancing rapidly. The silicon chip has worked miracles. It is necessary that we move from the old crude era of certain mechanical hardware to new electronic systems. Even ordinary requirements of railways themselves and of passengers and other customers can be largely influenced by what we are able to do by way of better service through the new means and equipment at our command. Even things like dynamic weightment of commodities loaded in wagons, dispensing of passenger tickets, computerisation of passenger reservation and other management information services need to be tackled with a sense of expedition so that we are able to cut down on our costs, increase efficiency and render better service.

I feel convinced that we must have a closer interface with other research bodies and organisations in the country, take advantage of the facilities they have and the equipment they possess. There is a very high experience gained by our scientific community. I understand that India's R & D infrastructure includes as many as 130 specialised laboratories and institutions. There are more than 700 in-house R & D units with public and private undertakings. We need examine and study what assistance we can get from organisations like the UNDP in order that we are able to organise and equip the RDSO on the lines it should be, for serving the cause of research and development in rail technology.

We will like to get the benefit of advice from eminent scientists and research scholars who are amidst us here today. It will be our endeavour that we derive full benefit of their advice and the facilities that their organisations are able to offer in our efforts. There is a growing awareness in the country towards a spectrum of applied research and technology transfer in major engineering sectors of the nation's economy. Railways have been in the vanguard of technological advancement. Our researchers and engineers have to make a meaningful contribution. The RDSO has to be an instrument of this crucial objective of a spirit of enquiry and innovation to permeate the Indian Railways. I recall the words of our Prime Minister who has said—"Scientific



temper can come only with scientific thinking and living, the stepping stone for which is the attitude of enquiry." Let us not stop at merely annual rituals by lapsing into platitudes but move forward with a concerted plan of action and a concrete programme of action with a feeling of commitment and sincerity true to the spirit of science.

3. Item 3 of Agenda—Proceedings of the 18th meeting of CBRR confirmed unanimously.

4. Item 4 of Agenda—Review of the action taken on the recommendations and suggestions made at the 18th meeting of CBRR.

#### 4.1. Oil to coal switch and new designs of small electric locomotives for shunting :

Dr. Jagjit Singh drew attention to this item and agreed with the views of the RDSO as mentioned in Agenda that use of producer gas instead of high speed diesel would involve very serious derating of the locomotive and that the item be closed. However, he mentioned that M/s. PERS have recently undertaken a project to use producer gas for a shunting locomotive. CRB decided that feasibility of developing a shunting locomotive capable of using producer gas be discussed by DG/RDSO along with concerned Directors with Dr. Jagjit Singh and M/s. PERS and put up recommendations for Board's consideration. However, use of such converted locomotives was ruled out for main line application.

CRB further mentioned that due to change in the technique a number of yards have been closed down and shunting is now being done with train engines in many yards. Consequently, a large number of steam locomotives could be converted, if the trials now being conducted by TELCO with steam accumulator type loco are successful.

On a suggestion from Dr. Gopal Tripathi of Banaras Hindu University that pioneering work may be started by the Indian Railways, CRB mentioned that there was nothing new in this technology as it has already been tried out during the War time and was given up by the advanced countries like West Germany.

#### 4.2. Projects concerning safety :

Mr. K.L. Puri of BHEL was happy to note that the Railways had developed an automatic warning system which is theft-proof. CRB, while agreeing that the thefts had reduced, felt that the real test lies in its use in the eastern region where the incidence of thefts is very high which is crippling the railway operations. He hoped that the new automatic warning system using fibre glass cover would prove successful in this area. On the suggestion from Shri A.K. Gupta of ISI to make use of conventional methods for checking thefts apart from technical innovation, CRB stated that conventional methods have not proved successful and in this context he cited instances where these methods had failed.

#### 4.3. Training of RDSO personnel :

Dr. Jagdish Narain, Vice-Chancellor of Roorkee University, mentioned that the railways have not taken full advantage of the training facilities available in Universities and technical Institutions. In all fields, technical knowledge has advanced considerably and it was therefore, necessary for the railways to update their knowledge by utilising available training facilities. Ministry of Defence has been availing of such facilities,

CRB agreed that a sub-committee could look into the needs of the railways for training of officers and staff. This sub-committee could also suggest suitable training programmes which may be undertaken by the various universities and technical Institutions for training of railway personnel.

#### 4.4. Selection of a few items for research :

Mr. Sampath mentioned that R & D organisation of the Defence Ministry have, in consultation with the IITs, identified research projects which could be undertaken in collaboration with the IITs. He felt that railway too could take similar steps. He suggested that a meeting for two days could be convened at Lucknow in which Director General and Directors of RDSO could hold consultations with the representatives of the technical Institutions like IITs, Roorkee University, Banaras Hindu University etc. and identify projects which could be undertaken in collaboration with these institutions. The technical institutions could assist railways in the development of technology, service techniques, reliability and safety criteria in problems relating to railways.

Dr. Gopal Tripathi, Ex-Director of Institute of Technology, BHU, mentioned that Defence Ministry allotted separate funds to the IITs/Universities and very useful work was done by these Institutions. The railways should similarly identify the problems and refer them to these Institutes. In this connection Shri K. Seetharamulu of IIT/Delhi mentioned that where necessary the technology should also be imported for meeting the railways, needs as has been done by the Defence for development of Radar Technology. Dr. Sampath mentioned that in P&TR Research Organisations, there are cases where lateral entry of experts in different fields has been made to improve the quality of research. A similar provision should be made for inducting specialists in the RDSO.

MM felt that the Sub-committee which would look into the training programmes of Rly. personnel should also identify areas of railway research where such interaction is possible with various research bodies, keeping in view the existing facilities available in the country and assistance required from agencies like UNDP, etc. In this context ME indicated that a paper has already been prepared by DG/RDSO for getting necessary assistance from the UNDP. CRB, while agreeing to the suggestion of the members desired that the DG/RDSO may check up the steps taken by the Defence Organisation and draw up the terms of reference for the Sub-committee. The Sub-committee will submit the training needs and programmes for the Railway and draw a detailed research profile for the Indian Railways.

#### 4.5. Feed-back about the various projects farmed out to various Institutions :

Member Mechanical wanted to know the present position regarding the dust problem in coaches which was referred to IIT/Kanpur. In this context, CRB mentioned that the problem had assumed importance in the context of running of 'Palace-on-Wheels' which was going to be a show piece of the Indian Railways. This train would run in the Rajasthan area, where dust ingress into coaches was a severe problem and this had to be tackled on priority. Dr. Sampath mentioned that some progress has been achieved in regard to the problems of dust ingress and a note will be sent shortly



#### 4.6. Research work on systems approach :

It was mentioned by some members that RDSO is presently concentrating more on problems of operational priority with short and medium term objectives. The members felt that there is need to concentrate on long term objectives by adopting a systems approach and developing expertise for rational design of track and vehicle systems and their sub-systems. Dr. Sampath mentioned that studies on mathematical modelling for studying rail-wheel interaction have already been undertaken by IIT, Kanpur adopting system approach

#### 5. Review of the work done since 18th meeting of the Central Board of Railway Research :

5.1. CRB mentioned that more work will have to be undertaken for increasing the speed and through put on the MG systems as it is not economically feasible, nor is it considered essential to convert MG to BG. In this context, he mentioned that transshipment facilities at interchange points have to be modernised. It was necessary to plan for increase in speed potential on the MG. The gains from introduction of high speed trains would not merely be in the area of travelling time being reduced but what was more important was the technical awareness which these higher speeds would bring in their wake. MG is all the more important as this is of interest to the countries in ESCAP region, which look up to the Indian Railways for technical expertise. It was contemplated to increase the passenger speeds from 100 to 120 km/h. Fruits of this uprating technology on the MG should be shared with other countries of the region. CRB and ME stressed that this would require a multi-disciplinary research team working in an atmosphere of dedication and diligence. For this purpose R&D infrastructure has to be sufficiently broad-based and engineers and technicians have to be suitably trained. ME mentioned that in-house training of engineers and technicians in engineering disciplines will be a practical step which RDSO should adopt and draw advice from specialists in IITs and Universities. Stress should be laid on design and equipment which will be inexpensive and easy to maintain, reliable in service and will also help in ensuring safety in operation. There is a need

to develop additional facilities in the RDSO to conduct system-oriented applied research as also to make use of facilities available with IITs and other leading research centres and also for meaningful interaction with them.

5.2. CRB mentioned that though a number of innovative operating techniques have been adopted in increasing the through-put on the Indian Railways systems, there were certain constraints. In particular, he mentioned that tipplers are proving to be a bottleneck in the early release of wagons and, therefore, the wagons with bottom discharge should be designed.

#### 6. Any other Business.

6.1. Shri P.N. Kaul, Chairman, RITES, stressed the need for up-dating the technology in the field of survey and construction as also export of rolling stock and other railway equipment and manpower. There is a demand for sophisticated equipment, such as CTC, wagons with air brakes, high horse power locomotives etc. He mentioned also that very little is left for export after meeting the requirement of the Indian Railways in the matter of railway coaches and wagons. Member Mechanical indicated that it has already been decided to export up to 10 per cent of the total output provided there is a demand and RITES are able to bag contracts. Of course, there was a need for updating the technology in respect of designs of new locomotives. CRB mentioned that a decision to manufacture BOXN wagons has been taken with the export objective in view. Since the BOXN wagon compares favourably with international standards Assistance from UNDP would, however, be necessary to import technology in the field of diesel/electric locomotives. ME mentioned that Indian Railways have got necessary expertise and capacity for design and manufacture of concrete sleepers, elastic fastenings, mechanised track maintenance equipment, signalling and wireless equipment, etc. and can, therefore, export the technology required to meet the needs of the developing countries.

7. The meeting ended with a Vote of Thanks to the Chair.



## CHAPTER IX

### SUMMARY OF RECOMMENDATIONS

#### Chapter II

##### RDSO : An appraisal

1. The technology gaps precipitated by the inept and inadequate performance of RDSO in research and development need to be overcome speedily.

(Paragraphs 2.1, to 2.5, 3.2, 4.1, 5.1, 5.2, 7.3, 7.4 and 8.1)

2. These technology gaps are on account of a variety of causes including absence of highly qualified, competent and dedicated R and D personnel, lack of modern laboratory and testing facilities and a somewhat superficial importance given to research and development. It is essential that the aberrations (as delineated in the Report) are removed for the emergence of an appropriate R and D culture on the Railways.

(Paragraph 8.4)

#### Chapter III

##### Tasks ahead and the role of R and D

3. It is incumbent to improve the service reliability of equipment inclusive of rolling stock, which has been affected due, inter alia, to the technological obsolescence of these equipment.

(Paragraph 1.4)

4. It is also essential to halt and reverse the stagnation and decline in the productivity on the Railways by modernisation of equipment and operational and maintenance practices of the system.

(Paragraphs 3.2 and 3.3)

5. The Railways should endeavour to handle the prolific growth of traffic expected by 2000 AD by means of technological inputs and the right working environment and culture rather than by a run-away growth of assets and manpower.

(Paragraphs 3.4 and 3.5)

6. In order that the Railways can increasingly participate in the export of both hard and soft wares to the developing countries, they have to remain abreast of the technological developments taking place in the advanced countries.

(Paragraph 3.10)

7. In order to assure the importing countries that the equipment being exported are of proven designs, the Railways should set apart a stretch of track of about 300 kms. for regular operation of these equipment, as a model section.

(Paragraph 3.11)

8. RDSO should be relieved of the responsibility of inspection of rolling stock which should be assigned to RITES in the manner recommended.

(Paragraphs 4.5 and 4.6)

9. RDSO's role needs to be redefined and limited to applied research, (except in the field of design development of advanced generations of rolling stock and other equipment) as also designs, standards, technical counselling and maintenance, and service engineering.

RDSO's responsibility should be attuned to the short-term objectives of the system.

(Paragraph 4.7)

#### Chapter IV

##### RDSO : Manpower

10. Since the quality of research and development hinges primarily on the personnel deployed, an enlightened and forward-looking policy should be pursued in building up a team of highly qualified and dedicated cadre of R and D personnel.

(Paragraph 1.1)

11. To enable R and D personnel to devote single-minded attention to their work, their status and remuneration should be commensurate with their qualifications and experience and the contribution expected of them to the Railway performance.

(Paragraph 1.2)

12. The paradox of 35 percent of RDSO's personnel being engaged only on such works as maintenance of offices, colonies, watch and ward functions, etc. should be resolved.

To make the organisation compact and oriented towards R and D, maintenance and watch and ward functions should be forthwith taken over by the Lucknow Division of the Northern Railway.

(Paragraphs 3.2 and 3.3)

13. Even in the Technical Directorates of RDSO engaged in R and D projects, the percentage of non-technical employees is unusually high (about 29 per cent). This should be drastically reduced.

(Paragraph 3.5)

14. To remedy the surprising situation of 44 percent of technical employees in RDSO having no technical qualifications, these employees should be assigned to the different Zonal Railways and Production Units and replaced by persons with adequate academic qualifications and experience but in appropriate clear.

(Paragraphs 3.8 and 3.9)

15. (i) Reprographic machines should take over the work done by Tracers, while computer-aided drafting machines should gradually take over the work done by Draftsmen. The Tracers and Draftsmen released from RDSO should be assigned to the Zonal Railways and Production Units. To achieve this, no existing vacancy of Tracer Draftsman should be filled.



(ii) To attract Engineering Graduates to non-gazetted technical assignments in RDSO, their promotion prospects will have to be adequately improved, on the basis of the recommendations made.

(iii) For promotion as Assistant Research or Design Engineer, a Degree in Engineering should be considered essential, and to the extent suitable qualified incumbents are not available in RDSO, competent persons should be drafted from the Zonal Railways and Production Units.

(iv) Directors of RDSO should be on the look-out for adequate talents in the Zonal Railways and Production Units for drafting competent and qualified Officers and staff in the different disciplines of RDSO.

(v) For efflorescence of research and development, RDSO should induct on its rolls adequate number of highly qualified experts and specialists in areas like computers, higher mathematics, statistics, vibrations, plastics, tribology, instrumentation etc.

(Paragraph 3.10)

16. In the observance of objectives set for RDSO, it is essential that an adequate number of officers with extensive field experience from the Railways are available.

The present practice of drafting bulk of its senior officers from the Zonal Railways and Production Units should, therefore, continue. No compromise, however, should be made in the matter of technical qualifications and experience.

(Paragraph 4.2)

17. 25 percent of RDSO's employees in non-gazetted cadre should also be taken from the Zonal Railways and Production Units on specified tenures.

(Paragraph 4.3)

18. Officers and staff drafted to RDSO from the Railways and the Production Units should be allowed to complete their tenure, and when working on specific important projects, should be allowed to stay till the completion of such projects.

(Paragraphs 5.2, 5.3 and 5.4)

19. (i) Officers and staff of RDSO should be sent liberally for exposure in various Research Institutions, Academies and Universities in India, and for this purpose RDSO's budget should be enhanced to Rs. 5 lakhs per year.

(ii) In order that there is no difficulty in sending out officers and staff for such exposure as often as possible, there should be a 5 percent trainee reserve.

(Paragraph 6.1)

20. Inter-action between RDSO and R and D institution within the country is necessary for keeping RDSO personnel abreast with the latest developments in the respective fields.

(Paragraphs 7.2 and 7.3)

21. The links between RDSO and the R and D institutions of advanced railway systems abroad should be effectively improved for which specific recommendations have been made.

(Paragraph 7.4)

22. Not only should officers and staff of RDSO participate in technical seminars and symposia, write papers and deliver lectures in technical forums, they

should also be encouraged to acquire higher post-Graduate qualifications as 'external students'. For all these purposes, an adequate scheme of suitable incentives should be enforced.

(Paragraphs 7.5 to 7.7)

23. The tenure of Director General, RDSO, should in no case be less than 3 years. He should be a distinguished scientist or technologist of proven merit and demonstrated brilliance. He need not necessarily be a railwayman and can be drafted from within or outside the country, from any sector.

(Paragraphs 8.3 and 8.4)

## Chapter V

### RDSO : Organisation

24. To enable RDSO to function effectively in consonance with its objectives, the institution has to undergo widespread changes and rationalisation of the organisation.

(Paragraph 1.1)

25. RDSO should cease to be an attached office of the Railway Board, and should be accorded the status and autonomy of a Zonal Railway, without disturbing in any way the existing terms and conditions of Officers and staff coming on deputation.

(Paragraph 1.2)

26. In order that safety and accident prevention are studied both in regard to the hardware content of accidents and software aspects of human failures, a Directorate of Accident Prevention should be set up.

(Paragraph 2.3)

27. In order that the Indian Railways can participate in the fast developments in signalling, electronics and telecommunications for a highly productive performance, there should be two separate Directorates, one for Signalling and the other for Electronics and Telecommunications, in place of the present single omnibus Directorate.

(Paragraph 2.6)

28. From the present miniscule Cell, the Traffic Research Directorate needs to be expanded and transformed into a vital and vibrant Directorate of RDSO, in keeping with the importance of programmes of research and development in transportation, marketing and commercial affairs.

This should be in line with advanced railway systems abroad where these are matters focal R and D attention.

(Paragraph 2.10)

29. Applied research in Civil and Mechanical Engineering should go from the Research Directorate to the respective Engineering Directorates.

The function of testing of rolling stock and track should continue with the residual Directorate which should be redesignated as Directorate of Testing (Track and Rolling Stock), and should work in close coordination with Traffic Research Directorate.

(Paragraphs 2.12 and 2.14)

30. In order that full advantage is taken of the latest developments in track technology and a well-conceived beginning is made in railway bridge engineering, there



should be two separate Directorates, one for Track Technology and the other for Bridges and Structures, in place of the present single omnibus Directorate.

(Paragraph 2.10)

31. The present Architecture Directorate may be abolished and for designs of major projects, the Railways may take advantage of the expertise available with well-known architectural firms, Research Institutions and Universities.

(Paragraph 2.23)

32. For designing and getting the approval to plans for building works other than the major projects, from Town Planning and Local Authorities, there should be an architectural cell available in each Zonal Headquarter, accommodated within the strength released from RDSO without creation of new posts.

(Paragraph 2.24)

33. Director General, RDSO should have clear authority to overrule Finance advice whenever it is required in the interest of research and development. That the Director General has this authority should be specifically confirmed by the Railway Board.

(Paragraph 3.3)

34. The powers of Director General, RDSO and his officers should be enhanced in different directions on the basis of specific recommendations made.

(Paragraph 3.5)

## Chapter VI

### RDSO : Equipment' resources and areas of research

35. Equipment and resources made available to RDSO are neither adequate nor up-to-date to meet the objectives of the system. They need substantial expansion, modernisation and liberalisation.

(Paragraphs 1.2 and 1.3)

36. (i) A Computer Centre, Captive Test Tracks for both BG and MG, an OHE Recording-cum-Research Car and a modern Electronics Laboratory should be provided for RDSO without delay.

(ii) A number of essential and important R and D equipment and testing facilities, as specifically recommended by us, should be procured without delay.

(Paragraph 2.1)

37. (i) RDSO may immediately adjure the practice of deploying unqualified men to work as Librarians and should recruit competent and qualified Librarians with a Degree in Library Science.

(ii) Similarly, RDSO should recruit a Translator in each of a few foreign languages indicated by us.

(iii) The Central Library of RDSO should be housed in a spacious building, adequately strengthened with technical books and literature with liberal provision of reprographic/microfilms facilities, and provided a computer package for storage and retrieval of information.

(Paragraph 3.4)

38. The R and D budget of the Railways at present is meagre. The Railways should appreciate the importance of R and D to the system, and quite substantially enhance the budget for research and development.

At the same time, the cumbersome rules and procedures for utilisation of the R and D budget should be streamlined and liberalised.

(Paragraphs 4.2 to 4.6)

39. Some of the areas where RDSO should direct its research endeavours have been recommended by the RDSO should take up research projects in these areas.

Our recommendations relate to transportation, terminals, permanent way and bridge engineering, design and development of rolling stock and locomotives developments in signalling and telecommunication, and environmental pollution as relevant to the Railways

(Paragraphs 5.2 to 5.22)

## Chapter VII

### Research Centres

40. For development of advanced generations of equipment and systems, Research Centres for Advanced Railway Technology would require to be set up. There should be no hesitation in initially importing the latest know-how for these Research Centres

(Paragraphs 1.5 and 1.6)

41. These Research Centres should be compact and highly geared units with unified technical and administrative control and should function independent of RDSO as far as control is concerned but in coordination with it. Each Research Centre should undertake a limited number of projects, with well-defined goals.

(Paragraphs 2.2 and 2.3)

42. These Research Centres need not necessarily be set up at Lucknow which is the seat of RDSO, but should preferably be located at places where there is a conglomeration of important national research laboratories and institutions in allied pursuits and disciplines.

(Paragraph 2.4)

43. The Research Centres should be manned by scientists, technologists and experts with proven merits and demonstrated brilliance. The Centres should have a cadre of their own to attract the best possible personnel and for this the Railways have to arrange for liberal emoluments and perquisites comparable with those in similar national institutions in the country.

(Paragraphs 3.1 to 3.4)

44. The Director General of any of these Research Centres need not be a railwayman. He should be an eminent scientist or technologist with proven background of R and D management. There should be no hesitation in drafting such an individual from any sector within or outside the country.

(Paragraph 3.5)

45. A periodical review, say once a year, should be carried out at the highest level on the functioning of these Centres. The review should be hard-hearted and pragmatic.

(Paragraph 4.2)

46. To begin with, Research Centres should be set up in the following areas :

1. Electric Traction
2. Diesel Traction
3. Control, Communications and Cybernetics.

(Paragraph 5.1)



47. We have recommended a number of crucial projects vital to different areas of performance of the Railways, and we suggest that the Research Centres should take up these projects for serious development.

(Paragraphs 6.2, 7.4, 8.2 to 8.6)

### Chapter VIII

#### The Role of Railway Board

48. Railway Board must share a large proportion of blame for the relative failure of RDSO in the field of research and development.

(Paragraphs 1.1 to 1.3)

49. As it is impossible for Member Engineering to adequately oversee and monitor research and development endeavours, in addition to his other responsibilities, particularly with the emergence of the Research Centres, other appropriate arrangements would have to be made.

(Paragraph 2.1)

50. The Railways should appreciate that no other single function on their system would assume such an importance in the coming decades as the modernisation and updating of equipment, technology and operational practices on the Railways.

(Paragraphs 2.2 and 2.3)

51. For this purpose, it is necessary that Planning and R and D activities should get fullest attention at the level of the Railway Board and that there is a combined and coordinated perspective for both.

(Paragraph 2.4)

52. CBRR has now become unwieldy and unprofessional. This should be reconstituted, made more

compact and comprise mostly scientists, technologists and specialists rather than ex-officio executives. It should also function professionally and in a business-like manner.

(Paragraphs 3.1 to 3.5)

53. There is need for revitalisation of both CBRR and the control over R and D and planning at the level of the Railway Board.

(Paragraph 4.1)

54. As for CBRR, steps should be taken for its revitalisation on the basis of specific recommendations made by us.

(Paragraph 4.2)

55. Similarly, there is need for arranging fuller and coordinated attention to planning and R and D. Specific recommendations for supervision and control of these activities at the highest echelon will be made later in our Report on 'Organisation'.

(Paragraph 4.3)

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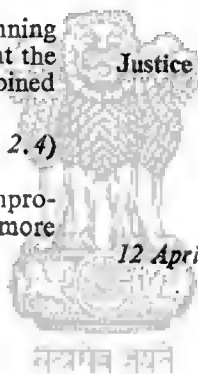
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12 April, 1987.







सत्यमेव जयते

भारत सरकार Government of India  
रेल मंत्रालय Ministry of Railways

# REPORT OF THE RAILWAY REFORMS COMMITTEE

Part IX

PERSONNEL

JUNE, 1983



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## INTRODUCTION

On having deliberated on the major areas of business of the Indian Railways, including Transportation, Permanent Way, Depreciation & Development Finance, Rolling Stock, Fare & Freight Structure, Security, and R and D, and reporting on them to the Government, we have been struck by the rather peripheral approach to Personnel Policy and Personnel Management. The result of this apathetic and ad hoc handling of matters relating to personnel problems of both workmen and management has been to erode the efficiency of the men on the rolls and the productivity of the system.

In their role as the largest employer of the country, with a work force of nearly sixteen lakh men, and a wage bill amounting to half of the total working expenses, the Indian Railways have the responsibility of becoming a model organisation to be emulated by the rest of the economy. It is not enough for the Railways just to get along, they have to infuse their men and managers with a potent system of training and development, as also motivation, application and morale of a high order, so as to derive from them a highly efficient and dedicated performance. To make this possible, the Indian Railways have to give up the ad-hoc outlook on personnel and take to a modern, and forthright approach to do justice to the avowed objectives of the system.

In this Report, we have dealt with some important aspects of personnel management on the Railways. We have started with a background, briefly giving a historical appraisal, and the applicability of general labour legislation to the Railways. We have thereafter considered the subject in specific Chapters on Manpower Planning, Recruitment, Training and Development, Industrial Relations, Structure of the Personnel Department and Career Planning, and a concluding Chapter on Motivation and Morale.

Although there is diversity in the various individual aspects of the different classes of Personnel, there is an underlying commonality of approach leading up to our conclusions and recommendations. Our investigations have revealed that whereas there is a vast array of rules and regulations, and even over-codification of practices governing the professional well-being of this large community of workers, personnel management lacks adequate thrust and has deteriorated over the years, to perhaps the least glamorous of the various disciplines of railway administration. As a natural offshoot there is lack of innovativeness, insufficient vigour, inbreeding, and a depersonalised system of handling matters relating to both staff and officers.

The approach to our recommendations is therefore, to introduce organised planning and application of management techniques to ensure that better and more suitable persons are recruited, they are adequately trained, and offered a career that they would find rewarding both materially and in job satisfaction.

Systematic manpower planning can no longer be neglected if we are to meet the challenges of the fast increases in traffic requirement, by keeping pace with technology changes, new activities in production centres, quick phasing out of steam traction, mechanisation of track maintenance, reduced yard activity etc. The basic qualifications prescribed for recruitment to various categories have to be revised to suit the present-day

needs. The recruitment has to be fair without any partiality and corruption. The system has to give confidence to the employees of justice and fairplay.

With over 700 categories of staff, there has to be a well-defined training policy without which all inputs in the form of additional assets, advanced technologies and systems can give but marginal gain. The Railways have, unfortunately not given due attention to training and development. Even the available training facilities are being utilised only to an extent of forty per cent. This coupled with shortfall in facilities, results in less than twenty-five percent of the training requirements being met. This is a situation which must inevitably generate inefficiency and a beaten-track approach.

We have considered training and development of manpower on the Railways as extremely important and have devoted two complete chapters on this subject. In these chapters after delineating the areas of short comings, a remedial strategy has been recommended in respect of both officers and staff. We have also recommended setting up of a Management Development Institute on the Railways, as indispensable to the toning up of a better management profile.

Trade union activity is an integral part of labour relations. The legitimate role of unions needs encouragement but, at the same time, there is need for a catharsis whereby the many negative features that have crept in over the years are purged, so that the voice of responsible trade unions is given greater consideration without pandering to wild-cat strikes and such other corrosive devices. To this end we have recommended certain changes both in trade union structure, and the grievance machinery. Mutual confidence and a commonality of commitment between various levels in the Railways has yet to emerge as a visible profile in the organisation. We have deliberated over this in detail, and have suggested rationalisation of the existing Institutions for Joint Consultation, and some vital changes in the role of the Personnel Department to encourage greater thrust in the union-management partnership for the common good.

A major aspect of the motivation and morale is the need for careful career planning and a dynamic promotion policy which would bring to the fore, brighter, more imaginative, and dedicated personnel. Changes in promotion policy have to be framed to do so, while at the same time not dampening the aspirations of the average worker. At the officers level too, greater weightage to merit is necessary. At the same time, attention is needed to improve career progression, since it is slow both as compared to other Government Departments and the present day concepts of management development in general.

In dealing with other aspects of motivation and morale, we have particularly emphasised the role of communication and the importance of staff being kept informed on all important issues relating to their welfare as well as their obligations. Without this even well meaning plans get bogged down in suspicion and mistrust. This is particularly necessary with the rapid anticipated changes of technology. We also believe that other important aspects of welfare policy especially housing, education of children and the problems of transfer need some liberalisation.



## CHAPTER I

### PREVIEW

#### 1.0. Introduction.

1.1. At the end of 1980-81, the Railways employed a regular labour force of about 15.7 lakhs, with another 2.65 lakhs casual labourers, adding upto the largest single body of workers in the country for any Department. The employees on the Railways are classified into nearly 700 different categories and are deployed over 7,200 railway stations, 450 traffic yards, 49 workshops, 4 production units, 300 locomotive sheds, 400 carriage and wagon depots, as well as a large number of offices, field units, research and training organisations. In addition there are a large number of mobile personnel deployed on the basic business of transportation. By 2000 AD, on the present basis, the strength may well exceed 27 lakhs.\* Personnel Management is, therefore, an imperative of future strategy and perhaps its most challenging task.

1.2. Government has the professed aim of improving the lot of the working class by setting an example, both as a model employer, and as a pace setter for industrial relations. Nowhere is its image as an employer more tested in the public eye, than in the performance and attitudes of Railway Staff. Towards this end, it cannot be stated that there has been notable success. Although formal strikes have been few, the restlessness and agitative attitude of railwaymen have repeatedly come to public notice. This is not a matter of statistical record alone. The Railways are a manpower-intensive organisation and we consider that a competent and well motivated work force is crucial to the efficient performance of the system.

#### 2.0. Management History.

2.1. The Railways were among the first organisations to create a distinct infrastructure for personnel management. Many Company Railways had recognised the need for a specialised personnel administration much ahead of their counterparts in other disciplines. As early as 1906, and Assistant Secretary in-charge of Establishment was made part of the Railway Board structure, and in the reorganisation of 1924, following the Ackworth Committee, a Member was given charge of Staff, Administration and Traffic. Two years later, there was a separate Member Staff †. As we shall see later in Chapter VI, labour relations had started assuming importance by the Twenties, when the Railways emerged in the vanguard of the trade union movement.

2.2. Today, there is a well-defined personnel management structure consisting of Chief Personnel Officers and Industrial Relations Advisers on each Zonal Railway, and each Division has a Personnel Department headed by a Senior Divisional or Divisional Personnel Officer. The post of Member Staff continues in the Railway Board, and he is supported by three senior officers looking after Establishment, Industrial Relations, and Management Services, respectively. Yet, we have almost everywhere found the morale low, both of officers and staff, grievances building up, and a widely prevalent feeling that administration of personnel matters is distant, impersonal and lacking in thrust, directness, and efficiency. Considering that nearly one out of every 45 railwayman is involved in 'Administration', there is, *prima facie*, little ground to believe that personnel services are suffering from any real shortage of manpower. The structure of the department and its staffing, however, have struck us as being not quite in tune with present-day needs.

#### 3.0. Rules and labour laws.—

3.1. The rules and regulations governing railway staff are of two distinct types. One portion of the rules is that which is applicable to all civil servants, and the other, that which is special to railway employees. These regulations are covered in two separate volumes of the Indian Railway Establishment Code. Administrative orders on Code rules and other allied matters are separately set out in the Indian Railway Establishment Manual‡. The rather special status of the railways, as not only a Government department, but also a public utility with an independent budget and considerable autonomy, has led not only to two sets of Establishment rules, but also a varying applicability of labour legislation.

3.2. The Payment of Wages Act 1936, the Workmen's Compensation Act 1923, the Factories Act 1948, and the Industrial Disputes Act 1947 are applicable to Railway employees, while exemptions exist in the case of certain other Acts such as the Employees State Insurance Act, the Employees Provident Fund Act, and the Standing Orders Act. There are areas where there can be some conflict between Railway rules and labour laws. The jurisdiction of Labour Commissioners, in particular, has been a matter of some doubt. It is, therefore, essential that in future labour legislation or amendments to the existing laws, the Ministry of

\* Discounting Production Units and Construction Projects the productivity of employees in terms of Net Tonne Kilometres per person employed on the Railways, rose by 63 percent between 1950 and 1960, 26 percent between 1960 and 1970 and 6.5 percent between 1970 and 1980. The reducing pace of productivity improvement is noteworthy and will have to be looked into as an important objective of planning. Taking the period 1965-75 as representative of future productivity improvement, the open line staff strength is estimated to rise to 2,678,500 by the year 2000 A.D., with perhaps another 80,000 regular employees in the Production Units and Construction Projects. It is possible, of course, to substantially limit this increase by much higher gains in density of traffic, and bulk handling with the use of higher technology, management through computers and employees with better qualifications and training. The Chinese experience is a pointer to the possibilities for the

future in these directions, even though there are fundamental differences between the two systems, inter alia in matter relating to passenger transport, discipline and labour relations.

† The Railway Board was not in a position to enforce its policy on establishment and labour question, on Company-managed Railways. Its authority was confined to suggestions and therefore, a unified approach to railway staff matters had to wait until 1944, when the bulk of the system had been directly taken over by the Government.

‡ Vol. I of the Establishment Code was originally framed in 1940 as the State Railway Code. It was revised to its present form in 1956, reprinted in 1971. Vol. II has had five reprints, the latest being, 1974. The Manual was first prepared in 1960 and a revised edition was issued in 1968.



ways ensures that suitable provisions are incorporated to suit its special requirements. For this purpose, there is a precedent in the manner in which hours of employment have been regulated.

3.3. The Government of India had ratified the Washington Convention of Labour 1919, which stipulated an eight-hour work day, and later, the Geneva Convention which provided for a weekly rest. The Indian Railway Conference Association then framed Provisional Rules, but these did not adequately cover the obligations imposed on the Government. Finally in 1930, an Act was passed to regulate the hours of employment, and the Indian Railway Act 1890 was amended by adding these as a separate chapter.\*

3.4. There are many provisions contained in various statutes which are applicable to some categories or the other (and not universally to all the categories) of this large labour force which includes industrial workers, ministerial personnel, running, station and yard staff, security personnel and a host of other categories with a wide spectrum such as medical, catering, public relations and research, we would, therefore, suggest that the Railways may for their use and the use of their personnel, compile a comprehensive volume of relevant provisions under the different Acts.

3.5. The provisions pertaining to the large labour force on the Railways are contained in no single statute, but in a very large number of them. Some of these provisions have direct bearing, while others have applicability by implication. The situation is confusing and leads to lack of understanding and conflict of appreciation. This is undesirable. That is why we believe that all these provisions should be collated and put in one place in a simple and forthright manner as applicable to railway staff. The Railways should compile this volume early.

3.6. Few issues have caused so much controversy as the Hours of Employment Regulations.† Labour was dissatisfied from the very outset, and in 1948, as a result of the Adjudicator's Award, the classification of Railway employees for hours of work was altered by the addition of one more category. Originally, it was only 'Intermittent', 'Continuous' and 'Excluded'; with only the last of these categories amply defined in the Statute. Railway administrations were free to decide each case, and the right of appeal was only for supervisory staff. With the Adjudicator's Award, the classification was altered to 'Continuous', 'Essentially Intermittent (EI)', 'Intensive' and 'Excluded'. There has been continuous pressure from many staff categories to have their classification changed, especially from EI to Continuous, in order to reduce duty hours. The special provisions for running staff have been a particularly sore point, and led to a series of work-stoppages in the early Seventies.

3.7. We are aware that many of these rules have since been liberalised in a phased manner. It has

nevertheless, been reported to us that resentment arising out of tardy implementation of these provisions still lingers. The position is likely to become more difficult as, with the passage of years, traffic builds up substantially and imposes greater demands on individual workers. Again, there are also many categories of railway staff including supervisors, who cannot be always bound by specific hours of duty and are liable to be called to shoulder onerous responsibilities at odd hours, outside their rostered periods of duty. It is necessary that adequate provisions are available to cover the duties of such staff and supervisors.

#### 4.0. Contract labour.

4.1. Apart from the regular work-force and casual labour, the Railways have a measure of responsibility for a third category, that of contract labour. They are one of the biggest employers of contract labour and have to comply with the provisions of the Contract Labour (Regulations and Abolition) Act 1970. Arrangements with contractors are required to specify that provisions of the Payment of the Wages Act and the Workmen's Compensation Act shall be adhered to by the contractors. About 65,000 such workers are employed on three activities viz. coal handling (including ashpit cleaning and cinder-picking), goods/parcel handling for transshipment, and construction projects. Although the Railways have managed to keep these activities from being departmentalised, they have not been able to exercise the requisite degree of surveillance on the contractor's performance vis-a-vis the two Acts. There have been several instances of the Central machinery for industrial relations taking up with Railway Officers their failure to prevent infringements of the provisions of these Acts.

4.2. In a note to the Committee, the Railway Board have stated that its officers can not find adequate time for supervising contract labour regulations, and have suggested that the Ministry of Labour play an active role in inspecting contractors establishments. We cannot subscribe to this view. The Railways have to supervise the implementation of a large number of labour laws in their establishments, and must, therefore, organise themselves to discharge their obligations in this respect also. There should be no difficulty in qualified Personnel Inspectors giving the necessary support to the officers-in-charge. This is one example of the role of the Personnel Branch not being adequately defined.

#### 5.0. Wages and salaries.

5.1. The basic pattern and components of the wage structure are determined by the scales of pay and allowances laid down for the Central Government employees as a whole. Government formulates these basic scales on the consideration of the recommendations of Pay Commissions. Adjustments for individual categories lie within the purview of the Ministry of Railways. They are also largely free to frame rules for certain type of allowances such as the Running Allowance for

\* While the various Railways adopted the provisions almost immediately, some Company Railways did not fully implement these until as late as 1941.

† These regulations break up the workers in various categories to determine rostered hours of work. The definition of each category is :

*Intensive* : When specially declared as involving continued concentration or manual labour, with little or no period of relaxation. This category was created only in 1948.

*Essential* : Where the duties are such that there are specified *Intensives* ; Periods of inaction during the rostered hours of duty.

*Exclusive* Special categories such as confidential staff, armed guards, instructors, supervisory staff etc.

*Continuous* : All others.

The daily rostered hours, maximum hours of work per week, rest periods etc. are different for the various categories.



locomotive crew and guards, night duty allowances etc. The arrangement is basically satisfactory and has prevented run-away pay-hikes, as has been witnessed in some Public Sector Undertakings, where there is a nearly complete autonomy to negotiate wages with organised labour. Nonetheless, there are certain special requirements for which conformity with Government pay-scales is restrictive, and prevents the requisite inflow of qualified personnel even when they are critically required. This is most apparent in the staffing of certain categories, e.g., the RDSO, Officers Training Establishments, and Specialist Doctors. The problem is likely to assume a bigger dimension when the Operations Information System, and other more sophisticated computer usages are instituted in depth.

5.2. The Committee recommend that while wage patterns should continue to conform to those applicable to Central Government employees in general, the Railways should be free to fix wages for non-cadred and temporary staff having regard to marked forces.

#### 6.0. Conclusion.

6.1. Personnel Management has a pivotal role in an organisation of the size, and variety of staff categories,

on the Railways. In spite of having been pioneers in this field in India, the Railways have not been able to develop a motivated and generally satisfied workforce. Both the structure of the Personnel Branch and its staffing are out of tune with present day requirements.

6.2. The general labour laws in India have varying applicability to Railway employees. Some are applicable in their entirety, some to only certain sections of the staff, while for some others the Railways are totally exempt. A manual should be drawn up collating all the labour laws relevant to Railway employees for the guidance of Railway officials.

6.3. Although there is much to be said for a general uniformity in wages of Central Government employees, this should not be too restrictive. From time to time, there is need to induct experts in special disciplines, who may not always find it worth their while to join the Railways in a rigid pay structure. It is, therefore, necessary to have some flexibility to recruit non-cadred employees on salaries and perquisites, left at the discretion of the Ministry of Railways.





## CHAPTER II

### MANPOWER PLANNING

#### 1. Introduction.

1.1. The importance of manpower planning in an organisation of the size of the Railways cannot be overstressed. The numbers involved are large, the categories numerous, and technology under constant improvement and change. Some idea of the annual intake can be had by the fact that during the past few years the strength of staff on the Railways has been rising by an average of about 32,500 employees per annum, while replenishment against staff wastages, through superannuation and other-wise, has been around an yearly average of 33,500. Thus, the annual intake is around 66,000, but the fluctuations are substantial from year to year, which itself is indicative of lack of adequate planning in past years.

1.2. It is easy to see that there is no integrated or systematic manpower planning on the Railways. While each departmental head in the Zonal Railway makes an annual projection of requirements for placement of indents on the Railway Service Commissions, this is not a very comprehensive exercise and, in any case, does not cover the bulk of the staff, who are recruited into Class IV, and many in Class III categories\* whose recruitment is decentralised. On the Divisions, staff are recruited on a more or less adhoc pattern, with little or no attempt to take long term factors adequately into account. We have also found during our various visits and discussions, that while on the one hand, there is a heavy demand for jobs on the Railways, Officers have invariably complained of having had to carry vacancies for extended periods. As indicated later, this has been due mainly to inadequate planning and defective procedure for recruitment. At the same time, there has been no notable success in reducing the size of the casual labour force which, in theory, is an instant reservoir for permanent induction.

1.3. Manpower planning is closely tied up with recruitment practices which, we shall deal with in Chapter III. The lead time to place a recruit in position is an important factor in planning, and, anticipations have frequently gone wrong leading to considerable distress in field formations. Of equal importance is the changing pattern of future requirements, on account of modernisation and change of technologies. This is most marked and proximate in the case of changes of traction from steam to diesel and electric. We have already estimated in Part II of our Report†, that phasing out of steam would reduce manpower requirements by about 108,500. The complications of such a huge manpower transition were spelt out in Part V of our Report@.

1.4. There are less spectacular but nonetheless significant redundancies on the cards by mechanisation of track maintenance. At least 25,000 men should be

come surplus through increased mechanisation of track maintenance, even when only 50 percent of the total track is so covered. It is not yet clear what is the scope of reduction in yard staff with increasing bulk movement and reduction of marshalling requirements, but we have noted that reduced requirement in the Asansol yard alone has resulted in a saving of 1,400 men.

1.5. In fact, in every aspect of railway working, there is a gathering momentum of technology and systems changes that should ordinarily result in catapult increase in the productivity of manpower. These gains are possible, however, only if a very carefully deliberated manpower-plan is framed and continually updated in response to investment planning, operational strategies and the profile of growth in traffic.

1.6. Arising out of what we have said in the foregoing paragraphs, it is possible to give a broad indication of the modalities on the basis of which the exercises on manpower planning should be based by the Railways:

1. An account, as accurate as possible, should be taken of the annual as also the quinquennial projected growth in the volume of rail-borne traffic.
2. The fields of additional activities that the Railways propose to enter into should be projected and accounted for as precisely as possible.
3. The fields of activities that are likely to be weaned out or given up, viz, phasing out of steam traction, closure of uneconomic branch lines, closure of locomotive sheds, maintenance depots, or classification yards, etc., should be projected and the attendant reductions in the strength of staff assessed.
4. The reduction in the strength of staff arising out of large-scale mechanisation, modernisation and rationalisation of assets, equipment and procedure that the Railways have to execute should be clearly assessed and accounted for.
5. The time schedule and period of gestation in regard to the recruitment of staff and Officers in different categories should also be properly delineated and accounted for.

1.7. We understand that a Cell for Manpower Planning was created in the Railway Board a few years ago, but it no longer functions in the manner it was originally conceived. This Cell should be pragmatically revived both to monitor the work on the Zonal Railways, and, more importantly, to issue policy directives. The Railway Board is the level where an overall

\* At present the Railways use Groups A, B, C and D in place of Class I, Class II, Class III and Class IV. We have, however, used the traditional classification throughout this Report, as this is generally used and popularly understood.

† Chapter VII, para 3.2.

@ Chapter III, para 3.1.



perspective on integrated planning and technology-phasing, is, and should be, drawn up; and it is only here that it is possible to anticipate longer term adjustments in staffing levels, their educational and professional backgrounds, and cadre alterations sufficiently in advance. There will have to be flexibility not only in manpower requirements but also their role as well as their recruitment standards.

1.8. An example of the role of such a Cell is the staffing requirements of the Computerised Operation Information System now being planned. This will entail not only a large requirement of specialists, but an altered role for conventional staff categories, some percentage of whom may need higher educational backgrounds. The individual zonal Railways are not in a position to independently forecast the requirements or determine the extent of changes necessary, but will constantly be required to help in formulating the overall plans.

1.9. Each Zonal Railway headquarters should be provided with an adequately manned wing for detailed planning. We shall deal with this subsequently in greater detail in Chapter VII, where we have suggested a model organisation. In this wing of the Personnel Branch, manpower planning, recruitment and training should be dealt with as a unified subject, with inter-departmental responsibility. This 'Man-Power Wing' would in turn, also monitor implementation and planning on the Divisions and Workshops. We recommend that similar Cells for planning at field levels in the Divisions and Workshops be created by reorganisation and adjustment in cadres, on each Division, to report directly to the Senior Divisional Personnel Officer.

## 2.0. Other aspects of Planning.

2.1. We conceive of manpower planning to have much wider ramifications than mere determination of intake. A number of aberrations have crept into the staff structure for lack of adequate foresight. We learn that more than sixty per cent of the workshop staff are over forty years of age, and in some individual workshops in the northern region the proportion is as high as 84 per cent. Unbalanced age-profiles are even more marked in the case of running staff. A representative check made by the Committee of a training school on the Northern Railway\*, reveals that the average age at which a man is being trained as a goods train driver exceeds 45 years. It rises to 50 years for passenger trains and 54 years for Mail and Express services. Not only is this higher age group in a safety category operationally undesirable, but as a logical corollary, a large number of drivers are being sent for refresher courses at a time when they are close to superannuation. Their interest cannot be lively and the limited capacity is effectively wasted.

2.2. We recommend that in the matter of manpower planning, two essential requisites should be scrupulously observed. First, the requirement of manpower in different categories, over a perspective period of 5 to 10 years hence should be worked out with some exactitude in keeping with the projected annual growth of traffic. Secondly, the procedure of recruitment should be such that this moves on a smooth annual pattern and is not bunched in any year. The latter would create difficulties not only in the matter of recruitment, but also in the training and development of staff so recruited.

Furthermore, this has serious implications on career prospects and motivation†. In place of such an approach, it appears that the Railways have been trying to get over the problems through *ad hoc* solutions causing wholesale cadre upheavals. This has been resorted to thrice in the past few years, even in the case of gazetted officers, because of annual variations in recruitment with variations as high as 500 per cent. The result has been a serious distortion to traditional command structure from which the organisation does not yet appear to have recovered.

2.3. It should also be mentioned that in the past few years, the Railways have had commendable success in entering the field of consultancy and project management both in India and abroad. These activities are officer-oriented, and also place a substantial additional demand for senior and experienced supervisors. This diversification has more or less coincided with an increase in internal activity through such factors as taking over of inspection from the other normal inspecting agencies, modernisation of workshops, Metropolitan Transport Scheme s, tourism, etc. Some additional production units also on the anvil.\*\* The Railways appear to have belatedly reacted to these fresh demands rather than anticipating them in good time. The number of directly recruited Class I Officers who form the backbone of these new activities is not large. They vary from about 200 in the S & T department to 650 in Civil Engineering@. It is, therefore, important that the cadre is not jolted by sudden demands which could have been anticipated and planned.

2.4. The number of factors that should be taken note of in manpower planning are, therefore, multifarious and complex. The persons responsible for manpower planning have to interact with all parts of the organisation and form an integral part of the part of the planning structure. As already stated later in Chapter VI, we have drawn up a model structure of the Personnel Department for this purpose. We wish to emphasize, however, that the nature of forecasting and futurism necessary to put manpower planning on a scientific footing places demands for skills and outlook for which the Personnel Department is not at present equipped. Reorganisation of the Personnel Branch, which we shall take up in Chapter VI, is an essential pre-requisite to adopting a more forward looking approach.

## 3.0. Financial correlation.

3.1. One question that has come up before us is whether manpower requirements need to be related to forecasts of financial results; particularly in the context of Staff Costs forming almost 52 per cent of the Ordinary Working expenses. There is no doubt that with a total staff cost exceeding Rs. 1,400 crores in 1981-82, containment of the labour force on the Railways will have far-reaching implications on its ability to keep itself out of the red. The British Rail Model for man-power planning has been particularly of interest, since it quantifies reduction in its work-force in relation to earnings as a prime objective.

3.2. We feel that, while this is an important consideration, in the Indian context financial results can only be used as a test device of the overall planning model. Unlike British Rail the Indian Railways are an expanding enterprise that have to meet ambitious targets.

\* Diesel Training School at Tughlakabad.

Cf. Chapter VIII.

\*\* See Part V, Chapter VI.

@ The total number of directly recruited Class I Officers on the Railways was 2876 in 1982 including doctors.



They should not, therefore, be unduly limited to a single corner-stone in determining their needs. Nonetheless some basic quantification of staff in relation to financial returns may help in deciding choices of technology and systems, and serve as a pointer to the economies of fare and tariff levels.

3.3. In the context of the pattern of development projected by us in our Reports, Indian Railways will on the one hand undergo scintillating phases of development, and on the other go through extensive modernisation, mechanisation and rationalisation, in order to grapple with fast developing traffic and increasing intolerance of inefficiency, and without run-away increase in assets and personnel.† While, therefore, additional staffing will be required for new activities and higher technologies, this to the maximum extent practicable, should be adjusted against the increasing level of surplus in manpower that the system must now necessarily throw up continually.

#### 4.0. Conclusions.—

4.1. There is no systematic manpower planning on the Railways inspite of over 65,000 persons being recruited every year. While some relatively short-term needs are determined by the individual Heads of Department for Class III staff, the recruitment of Class IV staff is mostly adhoc. The longer term factors are not sufficiently taken into account at any level and unless this is done, the Railways will not be able to handle modernisation and technological change smoothly. Even in the immediate future, lack of planning, coupled with poor recruitment procedures, leads to pockets of shortages inspite of surpluses at other points.

4.2. Manpower planning should take into account the increased projection of traffic, new activities and production centres, and changes in management systems. On the other hand, a detailed analysis of surpluses on account of factors such as reducing steam traction, mechanisation of track maintenance, reduced yard activity etc. needs to be spelt out against a time schedule. A deliberate plan should then be worked out, failing which suitable manpower may not be positioned in time and redundancies allowed to persist.

4.3. A proper perspective of overall planning is available only at the Railway Board level. A Manpower Planning Cell should be set up in the Railway Board to draw up policy directives which take into account technology phasing, lay down targets and review the work of the Zonal Railway in this connection. At each Rail-

way Headquarters a Wing should be set up for Manpower Planning, Recruitment and Training to cover all disciplines through an integrated approach. This Wing should also monitor the work of similar Cells in the Divisions and Workshops. This can be largely done by some reorganisation.

4.4. Manpower Planning should not be limited to determination of staff strength and their educational levels and training needs. It is also necessary to take into account career motivation through smooth phasing and avoidance of bunching.

4.5. The system has to be so evolved that persons will not require further retraining or move into demanding jobs at ages when they are no longer able to do justice to them. The present situation regarding locomotive crew is illustrative of this issue.

4.6. To take all these aspects into account, the starting point of Manpower Planning should be a reasonably accurate model of the organisation about ten years hence.

4.7. Of particular relevance is the expansion of the system into non-traditional activities. The decade of Seventies saw a great deal of this for which the Railways were not adequately prepared. During this period, inspection of spares was taken over directly, consultancy and construction companies set up, management contracts secured both in India and abroad, and a major thrust made in workshop modernisation. The future holds promise of further proliferation of such activities, as also fresh thrusts in technology, operation, consultancy and management.

4.8. The subject is a complex one and has to form an integral part of planning. The Personnel Department is not, at present, equipped for this function and will require a major change, both in its structure and staffing. Recommendations in this regard have been made in the subsequent chapters.

4.9. While there is a correlation between manpower, planning and financial results in some countries, this has a somewhat unique bearing in the Indian context. The Indian Railways are an expanding concern and will have to give adequate personnel support to new technologies, assets and systems.

4.10. To achieve this, adequate endeavour should be made to balance it with the surplus that the system must continually throw up.

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†Para 3.3 of Part VIII Report on Research and Development.



## CHAPTER III

### RECRUITMENT

#### 1.0. Introduction.

1.1. Recruitment of staff for the Railways is done through three different modes depending on the category. Class I officers are recruited by the Union Public Service Commission for the gazetted cadres in both technical and non-technical services. Recruitment to Class III\*, other than artisan categories, is handled by Railway Service Commissions. Until recently, there were nine Commissions with responsibilities generally along zonal boundaries. In 1982, another seven Service Commissions were created, with one of them having a split office in Jammu and Srinagar, along with a provision to hold some sittings at Leh. The jurisdiction of these Commissions is shown at Annexure A.3.1. The new distribution is essentially along linguistically homogeneous areas, and cuts across zonal boundaries. Finally, the recruitment of Class IV, and the occasional recruitment of Class III artisan staff, is decentralised at the individual divisions and workshops.

1.2. During our visits to different railway establishments and discussions with officers, it has repeatedly been brought to our notice that the gap between skills of workmen and present day technologies is large, and indeed widening. The consensus of opinion amongst knowledgeable field managers is that, while greater attention to training would considerably help in arresting this dangerous situation, the poor educational background of large sections of the present staff acts as a big restraint.

1.3. There is little evidence that sufficient care is being taken to relate recruitment standards with career planning, which, as in the case of manpower planning, is only loosely identified in the development projections of the human resource base. We will first deal with the recruitment procedures for Class III and Class IV staff who form over 99 percent of the total strength, and in the recruitment of which categories we have found many areas of weaknesses. The specific issues relating to recruitment of officers will be dealt with thereafter.

#### 2.0. Educational qualifications.

2.1. The basic educational qualifications prescribed for railway personnel continues in the old tradition of less demanding times. We reproduce here the relevant provisions in the Indian Railway Establishment Manual†.

- "1. Literacy as a qualifying condition should be insisted upon only for those categories for which it is essential for the proper execution of duties. Literacy should be taken to mean ability to read and write simple sentences in any language. It is not necessary to relate it to passing a prescribed examination or standard. The minimum standard need not be the same for all Class IV services. It would have to be higher for a Fireman and later as a Driver than, say, for a Khalasi.

2. For all other categories literacy should not be insisted upon, but as amongst candidates suitable for appointment, preference should be given to literate candidates. The standard of literacy required should be taken to mean ability to read and write simple sentences. No standard of literacy will be insisted upon for casual labour."

2.2. Nearly two-thirds of the Class III staff commence their careers as unskilled hands in Class IV, for whom such undemanding recruitment standards have been prescribed. The Committee would like to draw attention to the desirability of qualifications being related to a well-defined career plan, instead of merely the broad job requirements at the appointment stage. It is in the fitness of things, that the employees recruited at the bottom of the ladder should have reasonable prospects of improving their status at regular intervals, and, in order to do so, it is essential that they have the requisite educational background to ensure efficiency and competence in higher ranks. As a result of the policy so far followed on the Railways, the number of unpromotable employees on any reasonable standards, has assumed very large dimensions. This has led both to a sense of frustration among the staff and unacceptable dilution of standards in higher ranks. The Committee would like to emphasise that as long as the base is poor, dilution cannot be completely prevented even by higher percentages of lateral entry. Not only does this affect morale, but it prevents a judicious mix to ensure the preservation of organisational culture.

2.3. It is essential, therefore, that the Class IV recruit is a good raw material who can acquire the necessary skills in due course. The situation has considerably worsened in the past few years, as a result of the policy to absorb casual labour working on the Railways in permanent posts. 'Open market recruitment' has, therefore, been effectively cut out. It will be clear from paragraph 2.1 that no literacy standard has been insisted upon for casual labour. We learn that a very high percentage of the casual labour force is, in fact, totally illiterate.

2.4. We consider that to meet the technological needs of the future, and taking into account the educational opportunities available in the country today, a minimum of 8th Class be prescribed for all unskilled hands recruited to the non-technical departments, while 10th Class along with a two-year trade training be insisted upon for those taken into technical categories. In this context, technical and non-technical refer to job content in the concerned departments, and should not necessarily be construed as engineering and non-engineering departments in the conventional sense.

2.4.1. Suitable provision may be made for recognising various types of technical trainings such as ITTs, Apprenticeship schemes, experience certificates of ex-servicemen etc. The Railways could after due consideration issue an elaborate notification in this regard.

\* Class II is not a recruitment category and direct induction to this level is limited to temporary Medical vacancies

† Sub-Section IV (iv), Chapter X, Section P.



2.5. It may appear that there is an anomaly in our recommendations on account of our suggestion that even those with two-years technical training be recruited as "unskilled" hands. Our suggestion is, however, deliberate. It is necessary not only to have personnel who can be safely promoted but also those who have a sense of dignity for jobs which are frequently looked down upon as menial, such as lifting and transferring loads, cleaning of work spots and components, and working as helpers to more experienced artisans. In case, trained artisans are to be directly absorbed as "skilled" hands, a separate set of staff will have to be recruited for "unskilled" jobs, and their promotion prospects would be much abridged. It would also be necessary to set up extensive training facilities at each work spot\*. There is, therefore, a strong case for completely eliminating the category of 'Khalasi' or 'unskilled' and redesignating these categories as basic tradesmen, who will move into jobs of independent artisans in a time-bound period of two to three years, after having completed their basic induction process and gaining some experience subject to passing trade tests.

2.6. The Committee note that in November, 1982 the Railway Board accepted the recommendations of a Joint Committee† which had been set up to break a deadlock arising out of the recommendations of the Railway Workers Classification Tribunal. The major feature of the recommendations was that sixty per cent of all unskilled posts in the workshops and fifty per cent of those in the open line should be upgraded to semi-skilled grade, and be re-designated as "Helper Khalasi". There are two important issues which arise. Firstly, the number of personnel designated as "unskilled" in the traditional sense has been cut in one stroke to half. We foresee a major problem arising in the future by the creation of a new class of employees, who, though essentially "unskilled", will tend to shy away from the so-called menial jobs and exert pressure to lay down detailed job descriptions that will limit work flexibility. Secondly, this further creates the concept of a skilled hand having a helper. We consider this a retrograde step. Our recommendation to lay down adequate minimum qualification and induct employees as basic tradesmen would serve the best interests of both the labour and the management, provided that there is a time-bound promotion to skilled‡ ranks.

2.7. There is a perceptible rise in the level of literacy and education in the country. We do not anticipate any difficulty in attracting an adequate number of candidates with requisite educational qualifications for different categories. We have no doubt that once the minimum qualifications, as recommended by us, have been enforced, not only will the requisite number of suitable candidates be available but the task of the recruiting agencies will also get easier and more streamlined.

2.8. We would also like the minimum educational qualifications suggested by us to be equally applicable to casual labour. We have earlier drawn attention to the fact that this category is the basic reservoir for recruitment into the Railways, and, although its size can be reduced, we do not foresee a situation when this category can be totally eliminated in an expanding environment. There will always be pressure, and a certain ethical compulsion, to absorb casual labour in preference to fresh open market recruits. In order to ensure that the Railways do not perpetuate a poor worker base, it

is essential that casual labour has adequate background to serve the Railways' requirements in the permanent cadres. This would also, as stated earlier, considerably streamline the recruitment process itself. Casual labour is employed totally on an adhoc basis without even a suggestion of a selection. Insistence on basic qualifications would, therefore, become a natural screening process, and limit the extent of local pressures and vested interests in distorting the objectivity of the recruitment system.

2.9. To sum up, a minimum of 8th Class in the non-trade categories and high school with trade training for technical categories should be specified as the minimum qualification for the Railways.

### 3.0. Recruitment of Class IV staff.

3.1. It has been brought to our notice that, owing to the pressures on employment in the country, the Railways are having a great deal of difficulty in handling regular Class IV recruitment. Whenever vacancies are advertised, the number of applications is so large that the selection process takes several months to complete. Generally, a Selection Committee is set up consisting of an Officer of the concerned department, an Assistant Personnel Officer, and a co-opted member of the public, normally a teacher. The Selection Committee has to have several sittings because of the numbers involved, and it is difficult to coordinate the availability of three responsible selectors who have to find time over and above their regular jobs.

3.2. We recommend that the Railways approach the local Employment Exchanges for a list of eligible persons approximately three times the number of vacancies. Some vacancies may be left over for direct appointment by the General Managers and the Divisional Railway Managers on compassionate grounds, or other special considerations but always with the minimum prescribed qualifications. While this would considerably ease the difficulties in recruitment, we are also aware of the problem that registration with the Employment Exchange is not an easy process and has become very susceptible to a "sons of the soil" approach in many parts of the country. This makes it extremely difficult for the wards of staff working in transferable jobs, and it is necessary that the Railways are at least able to ensure equal opportunity for the dependants of their own employees in seeking employment. To this end, the Railways should adopt a more aggressive approach by arranging registration of their own employees' dependants with the local Employment Exchanges, in return for a commitment to use the latter's services to fill their vacancies. The same should hold good for any special recruitment of skilled artisans. Normally however we expect that they would be first recruited in Class IV, and later promoted.

3.3. In sum, we consider that the Railways shift the burden of screening to the existing infrastructure of Employment Exchanges, instead of getting bogged down in mass examination for which they are not geared.

### 4.0. Railway Service Commissions and recruitment of Class III Staff.

4.1. No feature of recruitment has come in for such universal criticism, and sometimes even condemnation, during our discussions with various railway authorities,

\* See Chapter IV. We have recommended that the Railways reduce the extent of basic training by suitable recruitment policies, and concentrate on more advanced and functional skills.

† Cf. Chapter V.

‡ We have used the term 'skilled' and 'unskilled' here in the widest sense, and not in reference to engineering trades. For example in the Traffic Branch, the Cabinman is skilled in the sense we have used the term. We are referring to promotion from Class IV to Class III in all departments.



and employees, as the functioning of the Railway Service Commissions, which according to the evidence given to us is not on merits. Yet these Commissions, which handle recruitment of Class III staff of non-artisan categories, for all railway departments, are vested with the responsibility of providing the Railways with the backbone of its system. An analysis of their performance also shows that, year after year, most of them have failed to recommend sufficient candidates, often to the extent of not even fifty per cent of the indents placed on them.

4.2. The failure of the Railway Service Commissions to meet the requirements of the Zonal Railways is puzzling in the face of the number of applications, which are sometimes more than one hundred times the number of vacancies. Table 3.1 gives an idea of the performance of two selected Railway Service Commissions in the 5-year period 1975-80.

Table 3.1

## Workload on Railway Service Commissions

Year	No. of vacancies	No. of applications received	No. recommended	Ratio of applications/vacancies	Percentage of selections made to the vacancies advertised
(1) Allahabad					
1975-76	2,518	1,05,243	1,250	42 : 1	49.6
1976-77	2,515	4,87,086	1,349	193 : 1	53.6
1977-78	1,387	32,623	1,224	24 : 1	88.2
1978-79	4,634	4,98,006	1,983	107 : 1	42.7
1979-80	4,047	4,80,000	2,876	118 : 1	71.0
(2) Bombay					
1975-76	3,096	16,122	1,730	5 : 1	55.8
1976-77	4,248	1,41,790	2,307	33 : 1	54.3
1977-78	5,429	1,86,985	2,174	34 : 1	40.0
1978-79	5,303	1,92,380	1,166	36 : 1	21.9
1979-80	11,721	63,086	5,062	5 : 1	43.2

4.3. There has been one extreme case, of the Muzaffarpur Railway Service Commission in the year 1977-78, when 1,73,000 candidates applied for 270 posts, giving a ratio of about 640:1. In spite of this, only 25 candidates were finally recommended, giving a compliance of barely nine per cent. One of the major reasons for such a poor showing is the excessive time taken by the RSCs in finalising selections. Although the evidence tendered by the Railway Board to the Committee indicates that it takes about 8 months in the case of technical categories, and 18 months in the case of non-technical categories, we have learnt that selections are often spread over nearly three years or more. It is only natural that candidates cannot sit idly at home waiting for results, and the better of them are soon able to secure employment in other organisations, which provide a more immediate means of livelihood. This has resulted in vacancies being carried forward from year to year, and, in the meantime, the zonal Railways are forced to fill the posts by ad hoc promotions from the lower staff categories without a formal selection. These ad hoc promotions often carry on for years together, and cannot be reversed without undue hardship to the staff. We have learnt of some cases of staff having officiated in higher grades for almost eight years on ad hoc basis, and then being suddenly faced with

reversions. In a situation of this type, it is impossible to find a solution which is fair, either to the employees or to the Railways, and it subjects the administration to avoidable pressures from labour.

4.4. However, the Committee would not like to give an impression that it is only the RSCs who are at fault. Many of the delays in the system are on account of lack of manpower planning and timely action by the zonal Railways. It is hoped that with the recommendations made by us in Chapter II, this difficulty would be considerably reduced.

4.5. The Commissions have some very real problems. They are under-staffed and operate on very tight budgets. An analysis of the Annual Report of the Madras Service Commission 1980-81 indicates that the expenditure per candidate was barely Rs. 7.30. Furthermore, some vacancies are unavoidable on account of non-availability of candidates against vacancies reserved for Scheduled Castes/Scheduled Tribes and ex-servicemen, especially in the technical categories. We have also noticed a disturbing pattern in the frequency of personnel changes.

4.6. The standard composition of the Commissions is a Chairman, a Member-Secretary and an Assistant Secretary, with about 28 to 30 supporting staff, inclusive of Clerks, Stenographers, Peons, Janitors, Chowkidars etc. The details of the establishment of a typical Service Commission (Secunderabad) which handles over 3,000 vacancies per year are as follows :

Chairman	1
Member-Secretary	1
Assistant Secretary	1
Office Superintendent	1
Confidential Assistant	1
Senior Stenographer	1
Head Clerks	3
Clerks (other grades)	16
Record Sorters	2
Class IV staff	6

In case of Gauhati Service Commission, the total number of supporting staff is only 11.

4.7. We find that Staff Selection Commission of the Government of India set up in 1976, handles about 3.5 lakh candidates to fill approximately 13,000 vacancies every year. More than 90 per cent of the intake is of Clerks and Stenographers, the balance being small numbers of Sub-Inspectors for the Delhi Police, Junior Accountants, Income Tax Inspectors, Senior Observers; there are also the departmental promotion examinations for these categories. To handle this work load the Staff Selection Commission has 43 gazetted and 259 non-gazetted staff, spread over six regional and two sub-regional offices, as well as the central headquarters in Delhi. As against this, a single Railway Service Commission frequently handles the same number of candidates. This heavy pressure results in delays, and prevents inputs into planning and innovation. Research and Analysis, and updating of methodology on which we place considerable emphasis, therefore, go completely by default.

4.8. The Committee have gone into the various deficiencies and recommend that the standard structure of the Railway Service Commissions should be of a



whole time Chairman and a whole time Member. The Secretary should be the Executive Head and not a Member of the Commission\*.

4.9. Each Selection Committee should consist of either the Chairman or the Member along with two co-opted members, one of whom should be a serving Railway Officer and the other a suitable serving officer from the local or neighbouring State or Central Government office. It is important that the co-opted Members are roughly equivalent in rank to the representative from the Railway Service Commission, in order to ensure that the objectivity of the system is maintained. The co-opted Members should have full participatory status.

4.10. The Committee note that recently the number of Service Commissions has proliferated from nine to sixteen. With this increase, there has been a fresh distribution of responsibility, each Service Commission being responsible for linguistically homogeneous zones. The Committee consider this a retrograde step which vitiates against the national character of the Railways. Multiplicity of Commissions also causes problems of administration and communication, and each zone will now have to coordinate with a number of Service Commissions. We recommend, therefore, that the Service Commissions be again brought back to nine, on the basis of one for each Zonal Railway. Even from the point of view of work load for each, this would be both a workable and economical arrangement.

4.11. We also recommend the creation of a Service Commission Headquarters, as an Apex Body attached to the Railway Board at New Delhi, to perform three important functions :

1. To serve as a Research and Analysis and Co-ordination Wing for all the RSCs. This body should have the primary responsibility of updating methodology of selections, coordinating with Universities, Academies, Institutes on personnel management, etc. to devise the most effective objective tests for each category, and formulate aptitude tests, safety consciousness etc. It should coordinate with Organisations for Special Groups such as Scheduled Caste Commissioners and Resettlement Directorate of the Armed Forces, with a view to ensuring that a wide field of selection is made available and vacancies are not carried forward. It will also coordinate and take counsel in research and development on multiple issues relevant to recruitment with Union and State Public Service Commissions, Staff Selection Commission of the Central Government, the Banking Services recruitment Board etc.
2. To organise and coordinate a single examination for categories where the candidature is not large. There are many categories in the Railways where the basic qualification prescribed is graduation, and it is expected that these Class III staff will be promoted as Officers within the first half of their service. To limit the effort involved in recruitment, and preserve the all-India character of their future role, it is recommended that a single examination be

conducted all over the country, as is being done by the Staff Selection Commission. While the logistics will be determined by the Apex Body, the actual written test (on one specified day) may be conducted by the RSCs on the basis of papers set by the former.

3. The Apex headquarters organisation should also provide to the Ministry of Railways a single supervisory agency to monitor the activities of the various Railway Service Commissions, and ensure their competent and just functioning.

4.12. Shri V.P. Sawhney however did not agree that an apex body as a Railway Service Commission headquarters, entrusted *inter-alia* with the superintendence of the zonal commissions, analysis and research of recruitment methods and procedures, was necessary, and felt that a cell in the Directorate of Establishment or Training in the Railway Board would serve the purpose. The Committee, however, considered the setting up of an apex body as integral to the reorganisation of the Service Commissions.

4.13. We have considered the question whether the apex body should have statutory status. Justice H.C.P. Tripathi strongly advocated this arrangement. He felt that by giving the Railway Service Commissions statutory status in the Railway Act covering *inter alia* the qualifications of the Chairman and Members, as well as the system of selection, public confidence would be restored in a system which has repeatedly come in for criticism. The Committee, however, considered that at this stage this should not be necessary. Moreover the procedure might delay the whole arrangement. For the present, therefore, the apex body should be created through an administrative order and the appointment of its Chairman and Members should be made by Government of India following procedures prescribed for senior appointments. The need for a statutory enactment may be considered in due course after gaining some experience with the working of the apex body.

4.14. Perhaps, the most delicate question regarding the Commissions is the manner in which their officials, especially the Chairman, are engaged and disengaged. The common impression is that such appointments, which carry onerous responsibilities and demand a clean image, have become over the years, a highly politicalised process. A large number of railway staff to whom we have talked, have hinted, and often clearly deplored, that selections frequently involve considerations other than merit. The effect of such a poor impression has a devastating effect, as it creates an environment for a new employee, at the very outset of his career, in which he begins to believe that corruption is a way of life in the Railways, and merit need not be given undue importance.

4.15. It is in the fitness of things that the Chairman of the Railway Service Commission is a Senior Railway Officer who should be appointed clearly in recognition of his outstanding professional attainments and who is known for his integrity. We recommend that Senior Officers in 55-56 year age group be appointed and given a reasonable tenure of 4-5 years. The posts of Members of the Commissions should be open to serving Railway

\* It is relevant to note that the Railway Service Commissions were first formed at the end of 1946 as "Joint Railway Service Commissions" at Lucknow, Calcutta, Bombay and Madras. An earlier Commission set up by the North-Eastern Railway in 1942 as a sequel to the report of Frank D'Souza on Minority Representation in the Railways, did not get amalgamated with the Indian Railway system after partition. At that time, all

Chairmen of the Commissions were former Railway Officers and their composition was as follows :

1. Lucknow	...	1 Chairman + 3 Members
2. Calcutta	...	1 Chairman + 1 Member
3. Bombay	..	1 Chairman + 4 Members
4. Madras	...	1 Chairman + 4 Members



Officers with sufficient background and experience, on a deputation basis. The Chairman and Members of a Commission need not be confined to Traffic or Personnel Departments but from any Department other than Medical and Security. The individuals to be selected should also have extensive field experience during their careers. This would ensure that the Railway Service Commissions are managed by a group of people of adequate standing and experience, and their management cannot arbitrarily be passed on to unqualified persons on considerations other than competence and integrity.

4.16. In order to attract suitable persons for these jobs, and also ensure that they are given a status commensurate with the responsibilities shouldered by them, it would be appropriate for the Ministry of Railways to examine the pay scales of the Chairman and Members of the Railway Service Commissions.

4.17. There is no doubt that, owing to a combination of factors, and sometimes questionable intentions, Service Commissions have, in the past, selected some peoples patently unsuitable for job descriptions. Some extreme cases have been reported of physically handicapped persons being recruited for jobs necessitating good physical coordination and considerable out-door activity. We have no doubt, that, by professionalising the structure of the Railway Service Commissions, such cases would altogether disappear. On the other hand, the Zonal Railways have also failed to make any organised attempt to give a feed-back to the Service Commissions about the quality of the candidates selected. Unless this is done, the Service Commissions cannot be expected to identify their lacunae and improve their methodology of selection. Validity checks should, therefore, be a continuous and formal process.

4.18. We recommend that it be made obligatory for the zonal Railways to report to the Service Commissions about the performance of selected candidates at the end of the training period, and again after about one year of functioning in a working post. While this is not practicable for the bulk recruitment categories, this must be done in respect of all selections handled by the Service Commission Headquarters. The practice also must invariably be followed for certain safety and supervisory categories. Done on a regular footing, this would help to improve the methodology of selections, and especially the psycho-technical aspects.

4.19. We would also suggest that the quality of investigation is improved by choosing good centres with a higher level of surveillance. The slight increase in costs for this purpose should be accepted.

#### 5.0. Open Market Recruitment.

5.1. The Railway Service Commissions do not handle the entire vacancies of Class III staff. A percentage of the posts is filled by promotion from departmental staff of lower categories, originally recruited as unskilled hands, for whom no educational qualification has been prescribed, and nothing more than an ability to read and write simple sentences generally suffices to qualify for promotion. The percentage of posts earmarked for recruitment from the open market varies from category to category. We have analysed the percentage of vacancies that can theoretically be filled by staff ori-

ginating from Class IV through promotions. The position regarding ten important categories is given in Table 3.2.

Table 3.2

Category	Percentage of @ posts that can normally be filled by staff originating from Class IV.
1. Guards	48
2. A.S.M	31
3. Yard Foreman	73
4. Section Controller	45
5. Chargeman (Mechanical/Electrical)	50
6. *Skilled Fitter (Mech./Elect.)	50
7. Permanent Way Mistry	100
8. S.O.M.	100
9. *Drivers (Steam & Diesel)	56
10. Power Controller	56

5.2. While the provisions for qualified personnel to be recruited from the open market is sizeable, the Railways have not been able to adhere to these percentages. Partially, this is the result of concessions made under pressure. This has had a most telling effect, in the suspension of the Apprentice Fireman Scheme in 1961 and irregular recruitment of Traffic, Commercial and Accounts Apprentices. For the past twenty years, drivers for sophisticated diesel locomotives are being drawn from amongst a group of staff for whom no educational qualifications are prescribed, and the 'literacy' test is limited to reading and writing simple sentences as the concerned Apprenticeship Scheme has been kept under suspension. Although drivers are required to go through training before promotion, standards have necessarily been relaxed; the choice being between sub-quality enginemanship or no drivers at all.

5.3. The case of workshop artisan staff, is, if anything, worse. With the suspension of the Trade Apprenticeship Scheme in the early Seventies, the Railways have drawn their skilled fitters, machinists, welders, foundrymen, etc. from unskilled staff without the benefit of any trade training. They are apparently expected to get self-taught by exposure. For an organisation with the resources of the Railways this kind of thing should not have been allowed to happen. While a provision to induct fifty percent of the skilled artisan staff direct from the open market, is theoretically available, this has rarely been resorted to, once again on account of pressures. In general the apprenticeship concept should be revived in all important categories of the Railways.

@ Many of these are intermediate grades and may draw people both directly, as also from lower categories initially recruited through the RSCs. For example in the case of ASMs, the vacancies are filled by (a) 50% from Probationary ASMs; (b) 25% from Signallers (c) 25% from Cabinmen, Levermen etc. Since all Cabinmen/Levermen and 25% of Signallers are drawn from Class IV, the theoretical percentage of ASMs

from Class IV is :  $25 + 0.25 \times 25 = 31.25\%$ .

\* The open market and apprenticeship scheme for these categories have been under suspension for many years, with the result that the effective representation of Class IV staff in these categories is now 100%.



5.4. The other reason for the open market recruitment of Class III staff not being maintained at the prescribed percentage is delay in positioning of candidates on account of failures both on the part of zonal Railways and Service Commissions. Adhoc promotions made from lower grade staff tend to be protracted and resulted in continuous shortfalls of personnel who are of the requisite standard.

5.5. In the background of increasingly higher technology and sophistication it is essential that the percentage of open market recruitment is examined for each category, and it is ensured that in no case is it less than fifty percent under any circumstances, and where a higher percentage is already prescribed, the same is invariably enforced. The past backlogs should be made good in a time-bound programme of three years. In order to do so, serving railway employees meeting the minimum qualifications may be given opportunities in order to not unduly depress the promotion chances of the existing work force. To give merit and suitability due importance the age limit of serving employees, for this one time effort, may be relaxed to forty years.\*

5.6. The percentage of induction from the open market (including apprentice categories) should be reviewed about five years after the more stringent application of the educational and other requisite qualifications recommended by us have been enforced. This would be particularly necessary in the artisan categories for which we have recommended full training prior to recruitment.

#### 6.0. The induction process.

6.1. There is an important question of the point at which the recruitment process is complete. The Committee are of the view that this process does not end until induction has been satisfactorily carried out. We have already recommended in Chapter II the creation of Special Cells for Manpower Planning and we shall elaborate this in greater details in Chapter VI. The same Cells would also look after the functions of recruitment and training.

6.2. In the Headquarters' office the functions of the Manpower Cells should be of a planning and monitoring nature, while executive action has to be taken at the divisional and workshop levels. These Cells should involve themselves with the induction process by formulation and provision of guidelines for new recruits, and for counselling, and placements in coordination with the executive officers. This would ensure that executive officers find time to make induction a pleasant and personalised process. It will exercise a healthy influence on the morale of the new recruit and also help in providing the necessary feed-back to the Railway Service Commissions. A close follow-up of the new recruit should enable the Railways to weed out undesirable elements at an early stage, and utilise the probationary period for genuine assessment instead of carrying out a mere formality.

#### 7.0. Methodology of examinations.

7.1. The Railway Service Commissions have now adopted mass examinations for popular categories and combined examinations for all technical categories.

This is a step in the right direction and will certainly help to cut down selection time and reduce costs. Considering the numbers involved, it would appear attractive to make the tests in two parts, the first being an objective type, to be used as a screening process. It may be possible to take computer aids to cut down time. The subsequent tests should be descriptive tests for the selected list, about a fortnight later, and finally an interview. The attempt should be to complete the whole process in a maximum of three to four months. For those categories for which psychological tests are considered necessary (in due course more and more categories should be covered by these), the additional test which is normally of a very short duration may be conducted along with the interview. These are highly specialised matters and should not continue to receive only routine attention as of now, but should be entrusted to the care of the Apex Body.

7.2. Many advances have been made in recent years in testing aspects of personality, character, the leadership etc. through objective tests. The Apex Body should actively coordinate with the various ISIs and other similar bodies to devise objective tests which are wider in scope than merely quantitative and qualitative analysis. These would serve as qualifying tests and would help reduce the number to be called for interview, which could be three times the number of vacancies.

7.3. It has been reported to us that one of the reasons for a large number of candidates appearing for a limited number of vacancies, is that there is no ban on any candidate appearing at another centre. Since it is possible for a person to appear successively at tests conducted by all the Service Commissions, this necessarily inflates the candidature lists by a large number of unselectable applicants. We recommend that to get over this problem, all the Commissions, at the instance of the Apex Body, should conduct the mass written examinations on the same date. The preparatory work to do so would have to be of a high order, and it would have to be ensured that the zonal Railways comply strictly with the last date for indents. We have already suggested that for the higher categories, a single examination be conducted. For the mass categories, the examination may continue to be separately organised but the written test should be held on a single date all over the country. In due course, with effect from January, 1985 a fixed annual time table could be adopted for all categories.

#### 8.0. Class I Officers†.

8.1. We have been apprised of the problem facing the Railways on account of fast expansion and diversification. This has resulted in a quick rise of Class III staff to Senior Gazetted Levels. It has been brought to our notice that, in this context, lack of adequate qualifications is felt particularly in the Engineering Departments and also Stores, Operations and Finance.

8.2. It would be proper that adequate qualifications are prescribed as a pre-requisite for promotion to Class I. We recommend that a minimum qualification may be prescribed for promotion to Administrative Grades, from Junior Administrative grade onwards, for the technical categories. We recommend that the minimum should be a degree like AMIE/Mech. Engg. etc. for

\* The exception would be artisan staff for whom we have recommended that the initial recruitment be of qualified persons but as Basic Tradesmen. Cf. para 2.5.

\* The present dispensation is the number of years of service put in, subject to an age ceiling of 35 years.

† There are certain other issues relating to Class II Officers, manning of the Indian Railway Personnel Service, and the Railway Board Secretariate Service which we shall deal later in relevant Chapter of this Report, and the Report on Organisation.



which there are sufficient facilities available in the country. For non-technical categories also, a Degree should be made essential. So as to ensure that this does not cause undue hardship, this should be made prospective only from January 1988. The Railways should arrange for their staff to improve their qualifications through correspondence courses, evening classes etc., with recognised bodies, and liberally provide for study leave, and practical attachments, as in case of a number of other Central Government Offices.

#### 9.0. Gaps in recruitments of officers.

9.1. There are three important areas concerning Class I officers which have a bearing on recruitment policy. These are :

1. Attracting talent in electronics to the Railways ;
2. Computer specialisation ; and
3. The dual arrangement for recruitment of Mechanical Engineers.

9.2. The issues involved have deep ramifications and we have, therefore, deemed it fit to invite pointed attention to these matters.

#### 10.0. Electronics Expertise.

10.1. There is an increasing use of electronics in every aspect of modern technology. Whereas Electronics is a subject central to the Signal and Telecommunication Branch, we find that its application has vastly increased in the past few years in the Electrical and Mechanical Branches also. This is of particular relevance for power and control electronics on diesel and electric locomotives, but there is also a rapid extension to machine tools, manufacturing systems, train lighting and in an almost endless list of instrumentation essential in all engineering fields.

10.2. Although exposure to Electronics is part of all engineering curricula, by and large, it is a peripheral subject, and we feel it would be necessary to bring to the regular officers cadres some engineers with greater interest and specialisation in this field. We consider it essential that persons with an electronics background in their sweep of professional interest, should be made available to the individual departments, and not through the setting up of a separate cadre which may lack interaction and awareness of field-level problems.

10.3. We suggest, therefore, that the syllabi and papers of the UPSC Entrance Examination for the S & T, Electrical and Mechanical branches of the Railways be modified so as to ensure that persons entering the Railways, have an adequate background of present day Electronics technology.

10.4. We have examined the syllabi on which the Engineering Common Entrance Examination is conducted by the UPSC, and recommend that for those entering the Railways, the following changes be made.

1. *Signal and Telecommunication Branch.*—At present, there is some coverage of general electronic circuits, digital circuits, and control systems, as a part of the papers concerning Communication Systems and Micro-wave Engineering. We feel this is not enough. We accordingly

recommend that one paper be entirely devoted to the field of Advanced Electronics since we conceive of the S & T Branch as the basic repository of expertise in this field for the Railways. This may be arranged by adjustment in the remaining papers.

2. *Electrical and Mechanical Branches.*—At present, about 20 per cent of one paper for the Electrical Engineers is devoted to Simple Electronics, Solid State Devices, Switching Circuits, Feed-back Amplifiers etc. There is also a small portion dealing with Control Systems. The Mechanical Engineering papers are overwhelmingly concerned with Thermodynamics, including Refrigeration (incidentally, this subject is dealt with by Electrical Engineers on the Railways, although it is not a part of their course, Fluids, Theory of Machines, Strength of Materials, Production and Industrial Engineering etc. There is no element of either conventional electrical engineering or electronics in spite of the fact that Mechanical Engineers on the Railways have to look after vast amounts of electrical and electronics equipment. In order to ensure that Electrical and Mechanical Engineers joining the Railways have an adequate background in Electronics, we recommend that for both these disciplines, one paper on Electronics and Control Systems be introduced, including the basic aspects of instrumentation, by similar adjustment of the remaining papers.

10.5. In Part VIII of our Report\*, we have recommended the setting up of a Directorate of Electronics in the RDSO. We envisage that this multi-disciplined organisation would be catalytic in bringing about a higher level of Service Engineering in Electronics and Semi-conductor Technology for a wide variety of applications. This Directorate will only be able to function efficiently if officers in the field, of the three disciplines mentioned, are also reasonably conversant with the subject. In addition to this, in-service training both for general refreshers and for specific applications of Electronics should be based around a single Institute for all disciplines,\*\* which alongwith the Directorate in the RDSO should provide the core of expertise in the ways.

#### 11.0. Computer Specialists.

11.1. We foresee a major revolution of computer applications in the Eighties. There is already a project team in position for a real time On-line Operations Information System, which has made some headway. We are informed that because of the sheer size of the Indian Railways, a system of this kind cannot be taken off the shelf from any source. Even if arrangements are made with the suppliers and foreign consultants† for an initial period, software will have to be developed for specific local needs on a continuous basis. There are also active plans for advanced systems of On-Line Production Control in the major Production Units, and a Computerised Passenger Reservation System. Some more advanced computer systems may later be brought into major overhaul workshops for integrated production control. In addition to these applications, we expect large-scale application of micro-processors for both data storage and processing in fields such as materials management, budgeting, accounting, personnel management, maintenance and many other package programmes.

\* Para 2.6,  
\*\* See Chapter IV on Training and Development.

† We shall be commenting more in this subject later in our Reprint on Management Information System and Railroad Electronics.



It is, therefore, of the utmost importance that the Railways plan to build up sufficient expertise in the field of computers and software.

11.2. We foresee a situation where the demand for Computer Specialists will be so high in the country that the Railways may not be able to attract sufficiently experienced persons in the face of market forces. They will, therefore, have to rely primarily on building up expertise amongst their own available officers and staff. We, however, do not recommend setting up of a separate cadre, atleast in the initial stages, until the extent to which such a cadre would be able to create an intimate interface with the various executives departments is clear, and equal avenues of promotion can be found for the new Group.

11.3. We recommend that :

- (1) The Railways quantify their requirements in broad profiles for hard/software specialists in a phased manner over the next two decade. The additional requirement of Class I Officers on this account should be included in the indents placed on the UPSC annually in the various regular disciplines in the major field streams, particularly concerned with Operating, OIS, Traction, Commercial, Accounts, Production Control, Inventory Control etc.
- (2) Young persons with 3-5 years experience in their individual departments should be put through Advanced Courses on Computer Systems and then be brought back to work in the field of Computer Software and Systems Analysis on the Railways.
- (3) In the initial stages, the Railways may resort to Consultancy for Specific Projects along with whom the Railways' Specialists can work. The Railways' own Specialists would be on a tenure with the Systems Groups of the Railways, in much the same manner that we have recommended for the staffing of the RDSO in Part VIII of our Report\* viz. while there would be a tenure, persons would not be disturbed until the project they are working on has been completed.
- (4) A Systems Analysis Group should be created on each Zonal Railway and placed under a Chief Systems Executive in the rank of a Level I Head of Department for coordination and programme execution with all other concerned Heads of Departments.

11.4. There will be large requirements of expertise in the field of communications engineering to support the OIS system. This may be drawn from the S&T Branch. As far as hardware and maintenance of computers is concerned, the Railways may train some of their own people, but it would be proper for the bulk of the work to be arranged with the equipment suppliers.

#### 12.0. Recruitment of Mechanical Engineers.

12.1. Alone of all the cadres on the Railways, the Mechanical Engineering Branch has two streams of recruitment, both through the UPSC, but at different levels of initial qualifications. Fifty per cent of the Mechanical Engineering vacancies are filled up through the combined Engineering Services Examination, open

to all graduate engineers, as is done in the case of other engineering departments of the Railways. The other fifty per cent are recruited as Special Class Railway Apprentices. These Apprentices are recruited to the Railways after a minimum qualification of Intermediate (Science) and are trained for four years during which they are required to pass the graduate examination of the Chartered Engineering Institute of the U.K. or AMIE (India). At the end of four years, subject to passing of the CEI/AMIE examination, they also become probationers for a further two years' training like other graduate engineers.

12.2. For many years now, there has been a debate whether two streams of recruitment are necessary and desirable. The Apprenticeship scheme was initiated in 1927 to meet persistent public demand for Indianisation in this highly specialised branch of Mechanical Engineering and it is sometimes said that this is no longer necessary. We are of the view that there is an advantage in continuing both streams. Under the Apprenticeship Scheme, we get good quality candidates as there are few rival demands for this age group, and there is an assured employment waiting at the end of successful completion of training. Getting engineers young is also an advantage as they get a feel for field management and labour problem.

12.3. We also find that the scheme of training at Jamalpur is not stagnant, but is linked to the syllabi of the Institute of Chartered Engineers, UK, and is being continually updated. Not much economy can be achieved by shutting down the Special Class Apprentice Scheme in any case, since it is only a small part of the Jamalpur Workshop complex, which has a total work force of 13,000 men.

12.4. We also consider that the other stream of open market recruitment should continue, as this provides persons exposed to larger teaching faculties, which has its own advantages.

12.5. For widening the perspective of the Apprenticeship Scheme trainees, we would suggest that a few months attachment course with an Engineering College or Institute of repute should be arranged. We understand that it should be possible to organize such an arrangement.

#### 13.0. Conclusions.

13.1. The educational qualifications specified for Class IV recruits needs a major change. At present, literacy is not specified for all categories, and even where it is prescribed, it is not related to passing any particular examination or standard. It is specifically mentioned as unnecessary for Casual Labour, who are later absorbed against permanent posts. This poor educational base has caused great harm to the Railways, particularly, because on an average two-thirds of Class III vacancies at present have to be filled up by promotion of Class IV staff over all departments.

13.2. Taking into account the increased educational coverage in the country, a minimum of 8th Class for non-technical and 10th Class alongwith recognised trade training for technical categories should be specified. These qualifications should be equally applicable to Casual Labour as well.

13.3. The recruitment of Class IV staff in Divisions and Workshops involves screening of a very large

\* Para 5.3,



number of candidates for which the Railways are not equipped. They should, therefore, meet their requirement in future from limited lists submitted by Employment Exchanges, equivalent to three times the number of vacancies.

13.4. To ensure that railway staff in transferable jobs do not get excluded in this process, management should ensure that the wards of their own staff are also adequately registered, subject to meeting the standards laid down, as a basic condition for using the services of these Exchanges.

13.5. Railway Service Commissions which are responsible for recruitment of Class III staff of non-artisan categories, have failed to provide the service for which they were intended, in an efficient manner. Recruitment time is far too high and there is lack of confidence in the fairness of the system. The situation has to be rectified by suitable staffing of Service Commissions, efficient selection methodology and a continuous audit of the functioning of Service Commissions. A Service Commission Headquarters should be set up as an Apex Body to rejuvenate the Railway Service Commissions.

13.6. The number of Railway Service Commissions should be reduced to nine, as per the previous arrangement, and the recent expansion on a linguistic basis should be reversed. Each commission should have a Chairman and whole time Member. The Secretary should not have a Member's status. For each individual selection two co-opted Members, of suitable rank, should be taken, one each from the Railways and the State/Central Government. The Service Commissions will be best headed by senior serving Railway Officers.

13.7. Functions of the Apex Body would be :

- (1) It should function as a Research, Analysis and Coordinating wing, and develop newer and more efficient methodologies for conducting recruitment examinations. For this purpose, it should coordinate with various other professional bodies including Universities, Personnel Management Institutes etc. who are in his field..
- (2) It should also coordinate with organisations responsible for special groups such as the Re-settlement Directorate of the Armed Forces and Scheduled Caste Commissioners to ensure that reserved vacancies do not go abegging.
- (3) This Headquarter should also coordinate a single examination for categories, with quick avenues into gazetted levels, whose candidature is not very large, especially where Graduation has been prescribed, so as to ensure the All-India character of a recruitment.
- (4) This body should also serve as a supervisory agency to help the Railway Board monitor the activities of the various Service Commissions.

13.8. A system of feed-back and validity checks should be established to ensure that the Railway Service

Commissions can constantly improve on the selection process.

13.9. The Railways should rejuvenate their apprenticeship schemes, which had served so well in the past. It should be ensured that in no case is the direct recruitment quota less than fifty per cent, and wherever this is higher already, this should be preserved. Largely, this is a question of enforcing the provisions already available..

13.10. Recruitment should not be seen merely as an act of recommending a candidate; the process can only be complete after a proper induction programme, for which the proposed Manpower Cells of the Railways should have supervisory responsibility. Induction should also be used to provide feed-back to the Service Commissions, and weed out undesirable elements during their probationary periods.

13.11. To cut down recruitment time, the Railway Service examinations should be conducted in two parts, the first being only of an objective type, to filter out patently unsuitable people. In due computer aids can be used for this. More reliance should also be placed on psychological tests alongwith interviews.

13.12. The candidature lists of the Service Commission are unduly inflated because persons not elected at one point continually appear at other centres. The Service Commission Headquarters should arrange for the examinations of common categories being conducted on a common day by all the Service Commissions. This will ensure that unselectable candidates do not add to workload through successive attempts at different places.

13.13. A paper on advanced electronics should be prescribed for recruitment of Class I Officers in the S & T Branch, since they will have to form the core of electronics expertise on the Railways. As there are also increasing applications of electronics in the Electrical and Mechanical Engineering Branches, one paper on Electronics and Control Systems should be made compulsory for entrants in these Branches also.

13.14. It is considered impracticable to have a special recruitment and separate cadre for computer applications which will have a vast expansion on the Railways in coming years. The requirements of personnel in this connection should be quantified and included in the indents placed on the UPSC for the regular main cadres. Suitable persons, after 3-5 years experience, should, then be sponsored by the Railways. for advanced courses, and brought back, on tenure to a Systems Analysis Group to be set up on each Zonal Railway.

13.15. The Railways should continue with the Special Class Railway Apprenticeship Scheme, as this provides a good source of high calibre engineers. There is an advantage also in catching people young since they absorb organisational culture and get a feel for labour dealings at an early age. Two streams of recruitment have several advantages. Special Class apprentices should be attached for a brief period, during their apprenticeship period, to a renowned Engineering institution in order to widen their exposure.



## RAILWAY SERVICE COMMISSIONS

Location of the Commission	Jurisdiction in terms of Divisions/ Production Units		Location of the Commission	Jurisdiction in terms of Divisional Production Units	
Ahmedabad	Vadodara } Rajkot } Bhavnagar }	Western Railway	Asansol		E. Railway
			Sealdah		
			Adra		S.E. Railway
			Kharagpur		
			C.L.W., Chittaranjan		
Ajmer	Ratlam } Kota } Jaipur } Ajmer } Jodhpur }	Western Railway	Bhubneswar	Khurda Road } Waltair } Chakradharpur }	S.E. Railway
		Northern Railway			
Chandigarh	Headquarters } Bikaner } Delhi } D.C.W., Patiala }	Northern Railway	Madras	Headquarters } Madras } Trichirapalli } Madurai } I.C.F., Perambur }	S. Railway
		Northern Railway			S. Railway
Jammu & Srinagar	Firozpur	Northern Railway	Trivandrum	Palghat } Trivandrum }	S. Railway
Allahabad	Allahabad } Lucknow } Moradabad } Izatnagar } Lucknow } D.L.W., Varanasi }	Northern Railway	Bangalore	Mysore } Bangalore } Hubli } Wheel & Axle Plant, Bangalore }	S. Railway
		North Eastern Railway			S.C. Railway
Muzaffarpur	Headquarters } Varanasi } Samastipur } Sonepur }	N.E. Railway	Secunderabad	Headquarters } Secunderabad B.G. } Hyderabad M.G. } Vijayawada } Guntakal }	S.C. Railway
		N.E. Railway			S.C. Railway
Patna	Mughalsarai } Dhanbad } Danapur } Katihar }	E. Railway	Bombay	Headquarters } Bombay (C.) } Bhusaval } Nagpur } Sholapur } Bombay (W) }	C. & W. Railways
		N.E. Railway			C. Railway
Gauhati	Headquarters } Alipurduar } Lumding } Tinsukia }	N.F. Railway			W. Railway
		N.F. Railway			
Calcutta	Headquarters of } Howrah }	E. & S.E. Railways	Bhopal	Jabalpur } Jhansi } Bilaspur } Nagpur }	C. Railway
					S.E. Railway



## CHAPTER IV

### TRAINING AND DEVELOPMENT—I

#### 1.0. Introduction.

1.1. We have already mentioned in Chapter I that there are about 700 categories of staff on the Railways. These have to be filled from barely half a dozen basic qualifications. For a large number of such categories, the discipline is totally unique to the Railways and there is no possibility of any training or exposure being provided either as part of general education or in any outside training scheme in the country. Categories such as Locomotive Drivers, Station Masters, Cabinmen, Guards etc. are obvious examples. Even within general disciplines there is often a degree of specialisation requiring training to suit the Railways' specific needs. Thus within the general ambit of civil and mechanical engineering, permanent way and rolling stock are identifiable sub-streams for which there is limited coverage in conventional curricular. Under these circumstances, and in the face of a staff strength of 15.5 lakhs regular employees, and manpower variety, training in the Railways assumes a significance with few parallels. The emphasis on this important subject, hitherto, has not been of a high order, and the overall impression gained by us is that the approach has been to do the minimum essential to keep the system afloat, instead of using it as a tool for high levels of efficiency, safety and customer satisfaction.

1.2. The build up of training on the Railways was somewhat slow in the early years, with the bulk of the responsible jobs going to non-Indians. The Acworth Committee of 1920-21 recorded that "Until recently opportunities for the technical training of Indians were lacking.....Formal instructions in methods of operations in all its ramifications-signalling, train control, station management and so forth needs to be provided." The Report went on to say : "The whole subject is one which in our view should be in the special charge of the Railway Commission, and we think substantial grants of money should be made for the purpose of developing such instruction."

1.3. Since that period, a great deal has been achieved and at present, there are 160 training schools in operation, providing various courses for Class III and Class IV employees, apart from four specialised institutes for officers. Yet we have noticed insufficiency and lack of quality in training, which has also been commented upon by every responsible body that has, in the past, examined the working of the Railways. Some of the relevant observations were :

- (1) The 1947 Kunzru Committee noted : "Any fall in the efficiency of the machine can be attributed mainly to deterioration in the standard of training and supervision."
- (2) The Study Team of the Administrative Reforms Commission for the Railways, in its Report of 1968, made several comments on the training of officers and commented that the Staff College at Vadodara would have to be expanded by almost a hundred per cent, and the

Permanent Way School at Pune by fifty per cent. It made an interesting recommendation that an institute for the officers' training should be set up at Lucknow, covering various disciplines, so as to draw upon the expertise and coordination with the RDSO.

- (3) The Sikri Railway Accidents Enquiry Committee of 1978 commented that they had come across several cases where staff connected with safety in train operations had not been to any kind of training course for periods as long as 15 years. It made a general statement : "This, in our opinion, is one of the main reasons for the dilution in skills which has become so evident in workshops and sicklines etc. Our visits to the Training Schools and Institutes did not reveal, by and large, a satisfactory state of affairs in the matter of utilisation of capacity, quality of instructors, equipment, models, literature, and even libraries."

1.4. We ourselves could not help observing that training was not treated with the seriousness it deserves. This was also reflected in the inability of the Railway Board to provide us with ready data. We found that figures regarding progress were available only for the safety categories, and, even these, only for half of the Zonal Railways. These figures were obtained from the Safety Directorate of the Railway Board and they referred to the position as it was a year ago. The limited figures revealed that 17,427 staff were overdue refresher training in the safety categories of the Central, Northern, South Central and South Eastern Railways.

1.5. The Committee later obtained statistics direct from the Zonal Railways, and the picture that emerged was dismal.\*

1.6. We have noted that there is no centralised arrangement in the Railway Board to lay down training policy or monitor progress. The arrangements at Zonal and Divisional levels are also, at best, haphazard. In the course of our discussions, we gained the impression that many senior officers and Heads of Department, do not consider training an important aspect of their functions, and only a very small percentage of them were interested enough to visit the training establishments with any frequency. We shall deal with issues arising out of these inadequacies in paragraph 4, but we consider it important that the persons responsible for the management of training and development should invariably be officers drawn from the field, and with adequate experience of working requirements. This is particularly relevant for the Railway Board where posts concerned with staff training have been provided in a Directorate, which is entirely manned by the Secretariat Service, which cannot be expected to have an intimate feel of the needs at grass root levels.

\* Cf. para 10 and Table 4.2.



## 2.0. Staff Training and Development\*—the approach.

2.1. The scheme of training should provide for four distinct aspects of in-service instruction. These are :—

- (1) Initial/Induction ;
- (2) Career Development or promotional training ;
- (3) Refresher courses ; and
- (4) Ad hoc specialised training to fulfill specific needs.

The pattern recommended above is applicable to all disciplines and levels of staff, the difference being only in the content and period of training.

## 3.0. Induction Training for Class IV staff.

3.1. Formalised induction, which should provide a smooth transition into the organisation, does not exist for categories where no initial training is prescribed. Class IV staff are normally put on the job immediately after recruitment, more or less without any organised method of training separately, or on the spot, and left to fend for themselves. Even at higher levels in Class III, the induction process is not always formalised, and it is particularly lacking for ministerial staff, and the Stores and Accounts branches in general.

3.2. Irrespective of the particular job for which a person has been inducted, certain steps are necessary to enable a new recruit to identify himself with the organisation, and be properly informed of the basic terms and conditions of service, and the role of the employee. We recommend that induction training be invariably provided to cover :—

- (1) An introduction to the Railways, its structure, and the role of the various departments.
- (2) Familiarising the new recruit with basic rules regarding leave, housing, medical aid, wage payment, uniforms, reimbursements, saving schemes etc. He should also be informed of basic personnel procedures, grievances machinery, maintenance of personal records, provident fund etc. ;
- (3) A broad idea of the channels of promotion, time schedule against which promotion can be expected, and the incentives available for additional qualifications, further education, etc ;
- (4) Disciplinary and Appeal Rules and procedures ;
- (5) Training, to the extent required, for actual working, which may vary from category to category, and from department to department.

3.3. We consider that induction training has important ramifications on morale, and helps start the new recruit with a healthy view of the organisation regarding personnel care. It should also serve to prevent inexperienced recruits being misled with regard to their basic rights and responsibilities, and being exploited by vested interests, which are often all too frequent in an environment where labour relations have not been notably harmonious and constructive, or generally lend themselves to such exploitation.

## 4.0. Induction Booklets.

4.1. We have already† commended upon the extremely complex rules and regulations that govern personnel policy on the Railways. The Codes and Manuals, in which these are contained, are bulky documents meant for the guidance of the personnel department, and even if simplified, will contain much information which is irrelevant for an individual employee, especially at the lowest levels. In any case, these would be too expensive to give as personal issues to all staff. To meet this shortcoming, we recommend that a simple "Induction Booklet" be prepared and printed in English, Hindi and the regional languages, and supplied to all new recruits. The contents should be in simple language and cover aspects of appointment, hours of work, holidays, leave, medical benefits, welfare provisions, disciplinary procedures, promotion policy etc.

4.2. The entries should be simple and brief. For example, "On completion of three years' service, a loan may be obtained from the administration for purchase of a cycle, a radio or a watch. The application form may be obtained from the office where your attendance, is marked." A general provision at the end : "For further details, you may contact the Welfare Inspector who visits your work spot every two weeks as per the programme put on your notice Board." If necessary, the portion dealing with promotion policy can be through a pasted slip to accommodate departmental variations.

4.3. In addition, there should be a separate part dealing with actual job functions for the various categories.

## 5.0. Induction of Class III.

5.1. For those employees who receive initial training before being put on the job, induction information on the above lines should invariably be included in the training programme.

5.2. The necessity of having good customer relations, and a sense of pride and belonging to this large national organisation, are important attitudes that must be inculcated early in the life of a railwayman, and should find place in the induction process at all levels.

## 6.0. The Supervisor's role.

6.1. Induction should not end merely with a two or three day orientation, and the provision of a booklet. In Chapter II, we have recommended that induction should be seen as an extended part of the recruitment process, and it, therefore, requires some follow up. It is impossible for any centralised recruitment or personnel organisation to involve itself continuously, and single-handedly, with an extended induction process, especially with staff being widely dispersed. A gangman, shunting porter or carriage and wagon khalsi cannot conceivably be monitored closely by a Personnel Officer. The executive arm of management has, therefore, to play a vital role in the process.

6.2. It should be considered a part of the duties of field managers to closely follow up the performance of new recruits, discuss their problems, arrange scientific placements etc. This is a role best performed at the Supervisor's level. As we shall discuss later, the status of the Supervisor has become considerably diluted, and he has ceased to be the type of father figure which was so much in evidence in earlier years. Formalising the

\* Officer Training is dealt with separately.

† In Chapter I, paragraphs 2 and 3.



Supervisor's role in induction and counselling would help in re-establishing the Supervisor's authority and basic empathy for those who work under him\*.

#### 7.0. Career Development and Promotional Courses.

7.1. Career development and promotional courses are the key to preservation of skills and morale in an organisation, widening the outlook of employees, and stimulating an urge for innovation. The difference between promotional and career development courses is that, promotional courses are a pre-requisite before promotion at certain stages, and are, therefore, compulsory. Failure of an employee to meet the minimum prescribed standard at promotional stages reflects that the individual has not acquired the necessary professional skills to handle higher responsibilities.

7.2. The training for such courses has necessarily to be in-house. Such courses are at present specified for very few categories, notably traffic and running staff. In the case of ministerial staff of the Accounts department, qualifying examinations are laid down, but there is no formal system of training. This is a half-baked measure, and more in the nature of a screening process, than a human development strategy.

7.3. The general absence of promotional courses on the Railways gives the mistaken impression that promotion does not involve a perceptible change of skills. This is manifestly incorrect since there are three distinct non-gazetted tiers each of which has several grades. This anomaly has arisen out of a false sense of economy and even apathy for the role of training. This is a negative and even dangerous mis-direction of management thinking. We recommend that job requirements in each department are studied in depth with a view to determining the level at which a marked change in responsibility justifies some promotional training.

7.4. While the subject would require an in-depth study, it appears to us that in a careerspan of thirty to thirty five years, there are at least two such stages in every department. An immediate example that comes to mind is the promotion of a highly skilled artisan as a supervisor. At a number of places, it has been mentioned to us that the present system of promotion on the Railways results in "losing a good workman and getting a sub-standard supervisor". This is precisely the kind of regression that promotional training avoids. Much the same thing holds, good for promotion of a Supervisor to the rank of an Assistant Officer.

7.5. In the case of promotion of an unskilled hand to Class III, there can be no substitute for promotional training. In addition, there are certain types of jobs for which promotional training appears essential. We have particularly in mind the categories of inspectors of various departments, notably in the personnel branch itself. The Ministry of Railways should have the subject studied on priority, and take these needs into account in determining training capacities.

7.6. The point that we would like to emphasise is that training and development of personnel through the medium of induction, promotional and refresher courses are entirely the business of the Railways. These have all to be by means of in-house training programmes with a suitable mix of training given through class-rooms and field-visits.

7.7. We would like to make a distinction in respect of career development courses, as distinct from the courses mentioned above. As of now, the Railways do not have sufficient facilities in career development programmes, apart from the nagging shortage of capacity which by itself has to be substantially augmented in respect of the other in-house courses. While some capacity in career development also can be gradually built up, it is appropriate and beneficial to expose the railway personnel, particularly executives to career development programmes which in sufficiently developed forms, are already available outside the Railways. It is our opinion, therefore, that for career development programmes, with particular reference to executives, increasing recourse should be taken to use specialised courses outside the Railways, in order to expose Railwaymen to knowledge and expertise outside, to the maximum extent possible.

7.8. A few examples of such career development courses available in India are those that are provided by Administrative Staff College, Bella Vista, Hyderabad; National Academy, Mussoorie, Defence Services Staff College, Wellington; National Defence College, New Delhi; and the various Indian Institutes of Management etc. Some specialised career development courses are also provided in such Institutes as Indian Institute of Public Administration, New Delhi and Indian Institute of Manpower Research, New Delhi.

#### 8.0. Developing Expertise.

8.1. Career development courses should be looked at from the viewpoint of acquiring in-depth expertises. At present, there appears to be very little method in it and we have noticed that, generally speaking, the specialisation aspect is not considered in nomination of staff to training slots. The correct approach should be to sponsor an individual for courses within a well defined range of subjects during his career, instead of a haphazard attempt to avail of opportunities as they come.

8.2. For example, method study, work study and operations research are a distinct field, while machine tool technology, production techniques, finishing systems etc. are another. According to the competence or inclination of a person, or the needs of the organisation, training in these advanced areas must conform to a plan that promotes adequate specialisation instead of the old Jack-of-all-trades concept.

8.3. Career development courses are, at present, largely limited to officers. We find insufficient justification for this limitation. The advantage of having a Workshop Foreman doing a course on industrial health and industrial safety, or that of an Office Superintendent on mechanisation of office procedure, is quite as valuable as that of a senior manager doing it, indeed perhaps more so in certain respects.

#### 9.0. Refresher Courses.

9.1. The third tier of our recommended strategy is refresher courses. These are essential to refurbish job knowledge, which is liable to dilute in course of time, through old traditions, standard practices or local emphasis. Refreshers also provide the opportunity to update technical knowledge and to familiarise a new-employee with methods and practices that have developed over the years. We have examined the availability of refresher courses and find that, on the one hand, for

\* This will be discussed in a later chapter on Morale and Motivation.



most categories no facilities have been provided and on the other, even where provided, they are inadequate or not fully utilised. We shall quantify this in greater detail in paragraph 10 later.

9.2. An examination of important staff categories shows that, for a bulk of them no refresher courses have been organised on most zonal railways. Details regarding fifteen important staff categories are, given below:

<i>Staff Category</i>	<i>Duration of Refresher</i>
<b>Operating</b>	
Traffic Signaller	6 weeks
Trains Clerks	Nil
Guards	2 weeks
Yard Masters	Nil
<b>Commercial</b>	
Ticket Collectors	Nil
Goods Clerks	2 weeks
Commercial Inspectors	Nil
<b>Civil Engineering</b>	
Works Supervisors	2 weeks
Bridge Supervisors	Nil
P. way Mistries	Nil
<b>Mechanical &amp; Electrical</b>	
Supervisors	Nil
Artisan Staff (Workshop)	Nil
Train Examining Staff	Nil
Drivers	4 weeks
<b>Signal &amp; Telecommunications</b>	
Wireless Operators	Nil
<b>Personnel</b>	
Ministerial Staff	Nil
<b>Accounts</b>	
Section heads	Nil

9.3. We recommend that refresher courses be made compulsory, and should be attended by each employee once in five years, unless person has, in the intervening period, attended a promotional course. For the safety categories, these courses should be attended once every three years. It has come to our notice that even when places are made available, staff often shy away from attending refresher courses, among other reasons, because of disruption to family life. It is important, therefore that refresher courses are as short as possible, and, in many cases need not be more than two or three days. At any rate they should not ordinarily exceed one week. We shall deal with the infrastructure required for training in paragraph 13 where we shall take a fuller account of the various factors that would help reduce the problem of both employees and the administration shying away from such training. We recommend, however, that refreshers also have a penalty aspect and

the failure of an employee to attend a refresher course within a specified grace period, should result in withholding further increments\*, and in case of prolonged recalcitrance, in reversion to a lower grade.

9.4. An important role has to be played by Controlling Officers to ensure that staff are released for courses when they are nominated. We have later suggested in Chapter VII that the organisation building approach of an executive be commented upon in the Annual Performance Appraisal, under a column "Development of Subordinates". Releasing of staff for courses should form an important criterion for this evaluation.

#### 9.5. Ad hoc Specialised Training.

9.5.1. Ad hoc specialised training can be covered to a large extent by availing of outside facilities or by periodically running such courses in the Railways' own institutes, if the coverage required is substantial.

#### 9.6. A resume.

9.6.1. To sum up, therefore, the Committee recommend that each employee be given an induction course which may be specially organised for those categories that are not given initial training. Promotional courses should be incorporated for all categories of staff at certain stages and refresher courses given a compulsory aspect. Career development and ad hoc specialisation should be provided by making the required use of outside facilities.

#### 10.0. Quantification and Training Needs

10.1. To get a closer picture of the total availability of training facilities and the extent of coverage the Committee had asked each General Manager for data regarding the number of personnel actually trained in the past few years. Table 4.1 gives the details.

Table 4.1

Progress of Staff Training			
Year.	Staff who underwent Initial Course	Staff who underwent Promotional Courses	Staff who underwent Refresher Reorientation and Special Courses
1. 1979-80	7,465	8,614.	21,426
2. 1980-81	8,174	7,859	18,890
3. 1981-82	8,466	7,194	19,671

Note.—Figures are for all railways except NE and NF Railways for which data was not made available.

Source : Zonal Railways.

10.2 The Committee have made an assessment of need-based requirements. We have taken into account average annual increases of staff strength and staff wastages in determining the number of required to be given initial training. For refresher,

It would be incorrect to penalise an employee if he is unable to attend for no fault of his own. Individual cases should, therefore, be treated on merit. The idea is to force the hands of

Controlling Officers to release staff for regular training. If they do not, such officers will expose themselves to grievance from staff and unions and displeasure from senior managers.



promotional and special, we have assumed that each employee should do six such courses\* in his whole career after initial induction, presuming that no one will normally be sent for a course after the age of fifty. To determine shortfalls we have further assumed that NE and NF Railways have been training 950 employees on initial and 2400 for refresher and special courses, based on the averages for the other Railways, even though the numbers in these railways is expected to be less. Table 4.2 gives an estimate of short-falls.

Table 4.2  
Shortfall in Training for the whole  
Railway system

	Initial Courses	Promotional Refresher, Reorientation and Special
1. Average number of staff trained annually 1979-82.	8,985	30,285
2. Committee's estimate of number required to be trained.	37,500	2,51,000
3. Ratio of staff trained to estimated requirements.	24 %	12 %

10.3 Whatever the inaccuracies in such an approximate estimate, there can be no doubt that the picture is dismal. Furthermore, while the Railway Board figures showed a backlog of 17,427 for refresher courses of safety categories in 1980, on four Railways, the figures directly taken by the Committee for these zones indicates the following figures.

1979-80	16,250
1980-81	19,460
1981-82	22,560

10.4. It is no surprise to us that Railway Board had figures for only four zonal Railways since it was only these railways who were able to report backlog figures to us also. The other Zones do not apparently even keep a record. Not only is the overall backlog rising, but in certain individual categories the situation has become quite serious. The backlog for locomotive drivers, for example, has risen from 137 to 1,634 over the past two years on Northern Railway alone.

10.5 The shortfalls shown in Table 4.2 are not on account of shortfall of capacity alone. The level of capacity utilisation has also been extremely poor. A case study of one Zonal Railway reveals that about two thirds of the available capacity is wasted. Table 4.3 shows this utilisation aspect.

Table 4.3  
Training capacity utilisation on the  
Eastern Railway

Course	1979-80		1980-81		1981-82	
	Capacity	Actually trained	Capacity	Actually trained	Capacity	Actually trained
Initial Training	1,709	951	1,941	544	2,001	1,369
Promotional Courses	1,776	1,306	2,503	1,405	1,706	566
Refresher and Special Courses	4,920	1,036	4,577	1,075	4,381	1,028
Capacity utilisation	39.2%		33.5%		34.7%	

N.B.—Capacity is a variable figure depending on the types of courses planned.

\* This is in conformity with a course every five years.

10.6 The shortfall capacity can change if a critical examination of syllabi reveals that the duration of courses is not related to needs. This is a matter of detailed study which should be undertaken by a special group at the time of framing the action plan we have discussed in paragraph 11.0. By and large we have found that, with some notable exceptions, while some courses are too long and certainly need to be shortened, there are a number of others where the courses are either too cryptic or cannot be shortened, even though the contents need to be revised for a number of them.

## 11.0 An Action Plan

11.1 Lack of adequate training cannot be combated on one plane alone. While the physical infrastructure has to be expanded, unless there is a major change in attitude at senior management levels, the railways will not be able to use training as the spring-plank for technological advancement and the highest attainable standard of efficiency, and there is even danger that the accumulated experience would get eroded. Many senior officers have told us that this is already happening. Yet we have found that very few of these same officers regularly visited training establishments or took an active interest in this field.

11.2 We recommend that the first step should be the adoption of an all-India Training Policy, with a view to giving this vital activity a central impetus in the Railway corpus, and the management policy programme. The policy should adopt clear targets along the guidelines that we have recommended in para 2.0.

11.3 In arriving at a workable action plan four important aspects would need a detailed study in particular of the following aspects.—

1. Determination of total training capacity required on the Railways as a whole. This should be further worked out in ample detail in terms of types, categories, durations (which if properly programmed can be reduced), class-room accommodation, hostel accommodation, number of instructors etc. The policy should be aimed at the creation of adequate need-based facilities within a period of 3-4 years. Ratioanisation of the existing training institutes should form an important competent of this exercise.
2. Separation of annual training budgets both on capital and revenue accounts, and establishment of need-based norms by empirical analysis.
3. Recasting of training schemes with the express purpose of making training facilities available, to the maximum extent possible, at the work spot, or near by. This will go a long way in overcoming the reluctance of staff to undergo courses.
4. An examination of personnel policy, both from the viewpoint of creation of adequate trainee reserves, and for cultivation of a proper culture, to bring about a sense of urgency to management and staff.

## 12.0 Training management

12.1 Before going on to discuss the implication of the recommendations made above, we may mention



certain structural changes, which would have to precede physical action to ensure a coordinated and well directed effort. We recommend that at each level of the administrative set up *viz.*, Railway Board, Zonal Headquarters and Divisions, there must be brought into position a Training Cell that devotes itself to planning, monitoring of progress, and validation of training. We have already suggested formation of Manpower Wings to look after manpower planning, and later suggested that they should also look after recruitment.

12.2 Training is an associated subject and the full range of responsibility in these cells could be made to include manpower planning, recruitment and training. We shall deal with the internal structural arrangements and interface of these cells with the other departments later (Chapter VII). We once again emphasise that these Manpower resource Wings\* should be manned by experienced field officers and must never be left to persons recruited primarily for secretariat functions, as the cells at the zonal level, or the Directorate at the centre, should possess a range of experience of working in the field, and should be expected to show considerable perspicacity.

12.3 One of the important functions that should be performed by these cells is that they should take over the basic planning, and piloting of investment for training facilities. At present, while the centralised training institutes, such as the Zonal Traffic Schools, do receive the benefit of some perspective the bulk of the training establishments are planned and developed through a process which is largely ad hoc and disjointed, because of the responsibility devolving upon individual divisions, workshops and even sub-divisions and yards. This tends to result in a mushroom growth without due regard to economies of scale and the needs of the system as a whole.

12.4 It is only at the level of a zonal headquarters that complete needs can be properly evaluated, and a plan evolved to ensure that each employee is provided need based training at specific intervals. This would help in bulking of certain requirements as between several divisions, or groups of workshops, and help in the development of facilities to cover similar categories in several departments. In certain cases sharing of certain facilities even between zonal railways may prove to be both economical and useful.

12.5 Such scientific planning cannot be effectively undertaken by the present organisation in which each headquarters personnel officer has only a general training charge for some disciplines. The functions of the Man Power Wings/Directorate, on training at the various levels should be.

1. At Railway Board's level to evolve training policy, monitor training performance on the Zonal Railways, and provide a longer term perspective by interfacing with the other Directorates. It should also evaluate the budgetary support sought by the Zonal Railways. The possibility of regional responsibilities for training establishments should be looked into and arranged by the Directorate, as well as temporary assistance from one Zone to another.
2. The Man-Power Wing at the Zonal level should have the primary responsibility for

management audit of the non-gazetted staff training. They should keep a watch on the implementation of training in divisional schools and directly supervise Zonal facilities. These cells should be responsible for processing the creation and expansion of training establishments as required, their staffing, and nomination of staff to training slots outside the Railways. The Committee envisage that these cells should serve as the main catalytic agents to bring about a change in attitude, and give staff development the much needed shot in the arm. Coordination with the functional heads of departments and the Chief Planning Officers, for training purposes, should be active and continuous.

13 At the divisional and workshop level one personnel officer should be earmarked for such functions. This is the grassroot level where monitoring has to be on an individual basis, and this function would have to be considered of the same importance as the conventional departmental duties.

12.6 In the scheme of things recommended above there is a clear philosophy of treating training as a vital function instead of leaving it as a generally neglected portion of the responsibilities of individual departments. This would ensure that there is a balanced growth, the needs of all departments are given equal importance, and the branch officers are relieved of direct responsibility which they have not been able to discharge adequately under the present set up.

12.7 The four aspects enumerated in Paragraph 11.3 as requiring detailed examination, need same explanation to focus on the issues involved.

### 13.0 Determination of Needs and Rationalisation

13.1 In Table 4.2 we had estimated that less than one-fourth of the staff annually requiring initial training are able to receive the benefit of formal courses. On the other hand, Table 4.3 bring out that the utilisation of facilities is less than forty per cent. From this it can be concluded in broad terms, that training facilities exist for about 60 percent of the need-based arisings of initial training. In the case of refreshers, promotions, reorientation etc. the existing facilities provide for meeting about thirty-five percent of the requirements. This then is the quantum of shortfall in broad terms.

13.2 A more detailed examination is, however necessary to establish the shortfalls for individual categories and the types of training establishments required. As an illustration, since the existing scheme of initial/induction is limited to Class IV and higher staff, the shortfall for these categories may well prove to be just marginal, while for Class IV staff it would be nearly one hundred percent.

13.3 Induction training for Class IV staff may not require a great deal in terms of physical infrastructure, and all that is perhaps necessary is to formalise a supervisor-based counselling system at each major work spot. On the other hand, the shortfall in refresher and reorientation training is more serious than is revealed by numerical figures above. While the Civil Engineering branch shortfalls are not so high, in the transportation and running categories they are alarming. For many

\* In the Railway Board it would be proper to give this the status of a Directorate.



categories, as we shall see in paragraph 13.4, there are virtually no facilities at all. To create a sound training infrastructure the Railways will first have to clear lay down the scheme of training for each category and evaluate the existing facilities for them, before any meaningful plan can be drawn up.

13.4. Apart from the four officer training institutions there are 160 training establishments in the country Table 4.4 gives the details.

Table 4.4

**Training Institutes on the Indian Railways**

<u>S. No.</u>	<u>Type</u>	<u>Total</u>
1.	Zonal Training Schools*	9
2.	System Technical Schools	11
3.	Basic Training Centres@	38
4.	Signal & Telecommunication Schools	6
5.	Area Training Centrest	20
6.	Engineering Training Schools	3
7.	Diesel Training Schools	13
8.	Electric Locomotive Training Schools	9
9.	Carriage & Wagon Training Schools	3
10.	Ministerial Staff Training School	1
11.	RPF Training Schools	4
12.	Statistical Training Schools	1
13.	Steam Locomotive Training Schools	7
14.	Divisional Traffic Staff Schools	17
15.	Miscellaneous	18
		160

13.5. The obvious conclusion that can be drawn is that, apart from the Zonal and System Technical Schools, which are generally one per Zonal railway, and Basic Training Centres which are approximately one per workshop, there appears to be no rationale behind the training infrastructure. A haphazard pattern of training establishments has come up owing to historical factors that have little relevance to the needs of the Railways as an integrated State undertaking. The existence of six S & T School, eight Divisional traffic Schools, three Carriage and Wagon Schools, and just one Ministerial Staff School indicates that the arrangements are neither related to a national nor zonal or divisional plan, and no attempt has been made to evolve a rational scheme.

13.6 It is educative to draw up a list of institutions per Zonal Railway. Table 4.5 speaks for itself.

Table 4.5

**Availability of Training Establishments on various Zones**

<u>Railway</u>	<u>No. of Training establishments</u>	<u>Total staff strength as on 31-3-1981</u>	<u>Average staff strength per training establishment</u>
Central Railway	31	204,956	6,845
Eastern Railway	23	215,398	9,782
Northern Railway	17	222,053	13,572
North-Eastern Railway	6	97,562	16,970

\* These are primarily for Class III Traffic and Commercial categories, and also cover locomotive crew for non-technical aspects of operation. They also provide training for staff of the Civil Engineering Department.

@These are normally attached to workshops for training of artisan staff.

<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>
Northeast			
Frontier Railway	4	83,930	22,265
Southern Railway	14	131,038	9,739
South Central Railway	25	116,965	4,831
South Eastern Railway	13	188,862	15,219
Western Railway	24	198,801	8,590
Chittaranjan Loco Works†	1	15,417	15,417
Diesel Loco Works†	1	7,794	7,794
Integral Coach Factory	1	14,106	14,106

13.7. In the Production Units the number of categories to be trained is limited to two or three only, and it is possible to build up and run a single training school for each such Unit irrespective of staff strength. In the case of the open line railways, however, some uniformity should normally be maintained as each of these has a similar but large variety of staff to regularly train for various departments. Some variations are inescapable, but a situation in which one Zonal Railway has a training institute for less than five thousand staff while others have to handle more than 22,000, is a reflection of the lack of standardisation, rationalisation and a need-based training infrastructure.

13.8 The Committee have taken various issues into account and recommend that there should broadly be two types of training establishments.

1. Facilities at major work spots and those with Divisional Jurisdiction (Branch Schools). These should be run by the Divisional authorities.
2. Establishments with Zonal Jurisdictions directly run by the Zonal Headquarters organisation (Specialist Schools).

13.9. The requirements of these two types are different, and our recommendations take into account economies by keeping the scope of these two limited to their unique features.

**14.0. Branch Schools**

14.1 We have already made recommendation in paragraphs 2.2 and 2.3 about the scope and nature of induction training of Class IV staff, who do not at present receive the benefit of any initial training. At points where the work load is heavy and the availability of supervisors is fairly large, this responsibility should be given to one of the senior supervisors at the work spot. Examples of this type are diesel and electric loco sheds, major yards, important railway stations, Divisional Offices, Stores Depots, Workshops etc. Wherever this is not possible because of the diffused nature of Jurisdiction, such as Permanent Way Staff, the induction training should be distributed to nominated senior

†These are meant for training of unskilled staff for promotion to Class III categories of the traffic branch.

Cf. para 13.7.



senior subordinates. Thus a PWI may look after the induction needs of all staff recruited to work under his Jurisdiction.

14.2. As recommended earlier, the person in-charge of this training should follow up actively for a period of six months or so, regarding progress of the employee, and the recruitment/induction process should not be considered to be complete until then. No schools need be built for such training.

14.3. The same general approach can be followed for the conversion, reorientation and refresher training of the lower categories of Class III staff with the difference that regular class room and instructional aids are inescapable at this level.

14.4. It has been brought to our notice that one of the major reasons for a shortfall in training is the reluctance of staff to leave their home towns for extended periods due to domestic and other pressures. An arrangement for training whereby staff have to be formally attached to a training establishment at a great distance from the place of residence also imposes strain on hostel accommodation, messing facilities etc., and may push up the cost of training to unacceptable levels.

14.5. The attempt should, therefore, be to provide such training either at the work spot or by enabling the staff to commute daily from their homes. On an average-Division of the Indian Railways, it is possible to conveniently commute from one end of the Division to a centralised point, without imposing any undue difficulties. On Divisions which are very large or have isolate and poorly connected branch lines, more than one school may be necessary and some sharing of facilities between divisions could also be profitably adopted.

14.6. As an example, for refresher courses, of artisan staff working Carriage and Wagon on the Kharagpur Division of the South Eastern Railway, a single establishment at Kharagpur would suffice. On the other hand, on the Chakradharpur Division of the same Railway, facilities would need to be created at two points, such as Rourkela and Sini, to conveniently cover the Kiriburu, Dongaposi and Hatia sections, all of which are branch lines with substantial number of carriage and wagon staff. In a third case, such as the Delhi and Firozpur Divisions, while Delhi, Ambala and Pathankot would serve only the Divisions on which they are located, facilities at Bathinda may have to serve adjoining areas of both the Divisions.

14.7. The important categories that we have in mind for a decentralised training scheme of this type are: mechanical artisan staff of locomotive sheds, carriage and wagon depots, electrical staff of locomotive sheds and coaching maintenance, traffic categories such as Cabinmen, Pointsmen and Levermen, SOM's and P.W. Mistries of the Civil Engineering branch, S & T artisan staff and junior ministerial categories. It is not necessary for each of these categories to have a separate school, depending upon the availability of space and infrastructural facilities. The diesel or electrical locomotive sheds are, or can be made, self-sufficient for training requirements since they are already provided with training schools for running staff and trade training to unskilled hands. They would of course have to be expanded to provide for refreshers to artisan categories.

14.8. New facilities on the lines discussed above are, therefore, required for carriage and wagon artisan staff, S & T staff, electrical general maintenance staff,

civil engineering mistries and traffic categories, wherever these are not available. To make it convenient for employees to attend such instruction, especially for those for whom commuting time can be fairly long, canteens should be provided in which subsidised mid-day meals can be given. Refresher courses should not ordinarily exceed one week, and wherever practicable even less. The time-table for such courses should be well drawn up so as not to coincide with pay day etc. which may require the employees to be available at their Headquarters station.

14.9. There should be a scrutiny made of specialised categories which are, today, generally drawn from unskilled hands without the benefit or proper training and belong to a trade which is utilised in many departments. The training of such staff, whether initial or refresher, normally goes by default. Welders, carpenters, machinists are some of the categories of this type. The training facilities for these categories should be centralised at one of the schools on the Division irrespective of the department to which they belong e.g. welders can be provided training facilities in a carriage and wagon school, machinists at a locomotive shed, and a wireman at the basic school for electrical general maintenance categories. The idea should be that each category is adequately covered and at the same time resources are not frittered away by multiplicity of arrangements.

#### 15.0. Mobile Training Branch Schools.

15.1. In certain cases, it is possible, and even desirable, to arrange for mobile training schools. In case the course content does not require much infrastructure by way of models and other teaching aids, specially constructed mobile training car accompanied by the instructor may visit various places, using any convenient room for class room instruction, while the mobile car can be utilised for models, cut-sections, mock-ups and simple practical demonstrations.

15.2. The status of such training should be normal and not merely as an added fire-fighting measure for a temporary period. At Annexure A. 4.1 we have given a broad scheme for Branch Schools, showing the coverage for each category.

#### 16.0. Specialist Schools.

16.1. For higher categories, it may not be practical to have a duplication of establishments on each division. The courses are likely to be longer in such cases, because the staff have to be imparted both trade updating and recall of rules and regulations, safety procedures, and familiarisation with systems innovations. Much the same type of syllabus has also to be covered for Class III staff who join as trainees or apprentices and have to remain in the training schools for several months, and in some cases as high as five years. Hostel accommodation is, therefore, inescapable. The requirement of equipment, audio visual aids, technical literature, libraries and the general accoutrements of advanced instruction, are of a nature that it will be advantageous to conceive these as Specialist Schools for each discipline instead of omnibus centralised training centres.

16.2. The existing Zonal Traffic Schools and Systems Technical Schools are examples of this type, but they currently lack adequate capacity. The Zonal Traffic Schools are not able to cope with the arisings, while in the case of System Technical Schools (essentially meant for mechanical department supervisors but also normally providing some space for electrical staff) on provision for refresher courses has been built in at all.



Facilities in these can be augmented either by expansion of the existing training institutes or creation of additional ones. In the latter case, the choice again is between separation of facilities on a functional basis (e.g. separate school for carriage and wagon and for loco-shed supervisors) or duplication of the existing arrangements at the same place.

16.3. The choice between expansion of the existing facilities and creating additional ones cannot be exercised on a general principle, and much would depend on the individual situation of each training establishment. We would, however, like to caution against expansion of any one training institute into an overly large set up, which may affect administration and result in depersonalised attention.

16.4. We have observed for example, that the Zonal Traffic School at Udaipur has provision for about 1,000 trainees at a time and it consists of six hostels and four different messes. Any additional load on a training establishment of this kind would only result in diverting the attention of the Principal and his senior staff away from their training functions and towards routine administration.

16.5. On the other hand, the System Technical Schools for mechanical staff are relatively small and there is considerable scope for expanding their facilities up to an economical and optimum level. As a general principle, the Committee recommend that no school be given responsibilities of training more than about 500 trainees at a time and the scale of facilities should be so designed that an instructor is not required to handle more than 30 to 40 trainees.

16.6. It is important that the investment on new training facilities is evaluated bearing in mind that training is essential and it is infructuous to have inefficient establishments which may appear attractive only on account of economics of scale. The expenditure on training should be looked upon as an essential operating expenditure with the same gut importance as operations, maintenance and fuel.

16.7. We have already mentioned that for many categories of staff there are no training facilities for essential courses. In fact some categories have no training facilities at all. Information gathered by us indicates that training of staff from the Personnel, Stores and Accounts Departments is non-existent on all Zonal Railways. The same holds good for ministerial staff. A number of Zonal Railways have also complained about the difficulties faced due to non-availability of training facilities in the medical branch, for promotion of unskilled hands in the technical departments, and in the promotion of lower supervisory staff to higher grades.

16.8. Some officers have stated that in many of the ancillary functions, absence of training has prevented improvement of standards for service to the travelling public. The bearers and cooks of the catering department have been particularly mentioned in this connection.

16.9. A theoretical model for training structure for Specialist Schools appears at Annexure A. 4.2. This is illustrative, and some variation between Zones may be inescapable especially on account of the different existing facilities and historical compulsion

16.10. The control of both types of schools shown at Annexure A. 4.1 and A. 4.2 (page 95-97) has been deliberately placed under the Man-Power Wings at the appropriate levels. We are of the view that the personnel branch has a prime executive responsibility to make available to the various departments a continuity of qualified man-power. We have also shown linkages with the concerned Branch Officers for the Branch Schools, and Heads of Departments for Specialist Schools, to emphasise that departmental officers should be intimately involved in ensuring that course contents are kept up-to-date, latest equipment and aids are used and there is a regular system of inspection to support the trainin effort.

16.11. The situation varies from Division to Division and Zone to Zone. The Ministry of Railways must look at the problem in its entirety and ensure that every single employee on the Railways is looked upon as an asset in the organisation with a distinct contribution to make. This would be possible only if he is kept professionally up-to-date and acquires the necessary skills to discharge his functions with high productivity competence.

16.12. At Annexure A. 4.3 (Page 98) we have identified the gaps in the training of important staff categories in the Railways. These gaps have been covered in the proposed Branch and Specialist Schools shown at Annexure A. 4.1 and A. 4.2 (Pages 95-97) respectively.

#### 17.0. Training Budget.

17.1. The total amount booked on staff training during 1979-80 was Rs. 7.13 crores and in 1980-81 Rs. 9.11 crores. This is inclusive of Hindi training which is a general obligation unrelated to job knowledge. Table 4.6 (Page 89) gives a split of the expenditure on training in the past two years.

Table 4.6

#### Expenditure on Staff Training

Year	Total staff training costs in Rs. (crores)	Percentage break up on				Percentage spent on training to total staff wage bill
		Cost of Trg. Estt.	Pay & Allowances of staff under trg.	Charges paid to external Trg. bodies	Hindi and others	
1979-80	7.13	50.6	39.5	6.45	3.3	0.70
1980-81	9.11	50.4	42.5	2.30	4.7	0.79

N.B.—All figures exclude officers.

Source.—Accounts Directorate, Railway Board.

17.2. The figures speak for themselves. The Railways have not been spending even one per cent of the staff wage bill on training, and in terms of total working expenses, the figure is barely 0.3 per cent. This is surely a poor arrangement of priorities to better the health of the Railways. Even one per cent improvement in staff productivity brought about by adequate and proper training would, on economic considerations, justify doubling of expenditure under this head.

17.3. We have suggested in paragraph 11.2 that norms be established by empirical analysis of the budgetary support required for raining. Later in Chapter V we have recommended an overall provision of five



per cent of the staff strength for trainee reserve posts. Considering that only around a quarter of the requirements of initial training and one eighth of those for refresher, promotion etc. are being met, the amount necessary for the pay and allowances of staff under training would have to rise to about Rs. 16-17 crores against the Rs. 3-4 crores presently being spent. As for as the cost of training establishments is concerned, since these suffice for approximately 60 per cent of initial training and 35 per cent of refresher and promotion needs, the expenditure may have to be increased to about Rs. 10 crores as against the Rs. 4-5 crores at present.

17.4. We have also suggested that career development and special courses should be availed of from outside bodies and this facility is hardly used by the Railways for all personnel other than officers. As a first step if expenditure on this is raised to about Rs. 1.0 crores against Rs. 20-30 lakhs at present, the need-based annual expenditure on training would be of the range of Rs. 25-30 crores viz., a two-and-half fold increase over the present situation.

17.5. We have made broad projection of expenditure levels, inspite of our recommendations to establish norms by empirical analysis of detailed needs, only to highlight that higher budgetary allocations should not come as a shock. The Railways should be prepared to allocate 4 to 5 per cent of the staff wage-bill for training purposes as a first step. Furthermore, the requirements of capital investment for establishing need-based facilities will be another item of expenditure which should not be linked with any financial return as conventionally viewed.

#### 18.0. Conclusions.

18.1. The large work-force of the Railways has very special training needs for which facilities are not available outside the Railways. This subject, however, has not been treated with the seriousness it deserves, although it has been adversely commented upon by successive Committees that have gone into the working of the Railways.

18.2. Training should devolve on four distinct types, viz. initial/induction, career development and promotional, refresher and specialist. A training infrastructure should be built up to ensure that adequate capacity is built up to work to this scheme for each category in the Railways.

18.3. Induction, as a concept, does not exist at present. This should be provided to Class IV staff by counselling from nominated supervisors, and for Class III and other staff, who receive initial training as a part of it. The basic idea is to introduce the new recruit to the structure of the Railways for familiarising him with basic rules, personnel matters, grievance machinery, discipline and appeal rules etc. at the end of which, a simple "induction booklet" should be given to each new employee.

18.4. Promotional courses should be specified at certain distinct stages in the career of each person and should have a compulsory aspect. Career development course, on the other hand, need not be arranged 'in-house' and facilities available outside the Railways should be availed of to the maximum extent. These courses should be to a well-defined plan so as to develop specialisation in distinct fields, by successively more advanced courses. Refresher Courses are considered a sine qua non for keeping up efficiency and updating

knowledge. They exist, at present, for very few categories. They should be organised for nearly all railway staff broadly on the basis of once every five years, but the interval should be reduced to three years in the case of safety categories. Ad hoc specialised training should, like career development, draw upon facilities outside the Railways to the maximum extent.

18.5. Initial training is being provided to barely one-fourth of the extent necessary on need-based requirements. In the case of promotional, refreshers, reorientation etc., it is barely twelve per cent. At the same time, capacity utilisation is under forty per cent. A plan is, therefore, necessary, both to utilise the existing capacity to the fullest extent and extend this capacity for a hundred per cent coverage, related to needs.

18.6. To bring about a dynamic training culture, it is vital that an All-India Training Policy is evolved, involving the determination of needs in terms of types, categories, infrastructure etc. and a specific plan drawn up to meet the full requirements within a period of three to four years. The annual training budget should be separated and norms established by empirical analysis. In the training policy, the attempt should be to bring training to the employees, work spot to the maximum extent possible, and an adequate number of trainee reserve posts created, to ensure that staff are invariably released once they are nominated. The incentive aspect of optional training, and penalties for non-attendance of essential courses should be looked into.

18.7. A training management has to be created by setting up a special Directorate in the Railway Board to lay down policy and provide a perspective for guidance of the Zonal Railways. Presently it is loosely dispersed all over with none monitoring the progress and implementation. This Directorate should also clear the Zonal Railway budget on training. On the Zonal Railways, the Manpower Wing in charge of manpower planning, recruitment and training should take over the basic planning functions and piloting of investments for training facilities. They should also directly run zonal level facilities and monitor the performance of Branch Schools on the Divisions. At the Divisions and Workshops, one Personnel Officer should be earmarked for the training functions and should also directly look after the Branch Schools under the Divisional jurisdiction.

18.8. There are at present, 160 training establishments for non-gazetted employees, but they are neither on a Zonal nor a divisional plan and, for certain categories, there are virtually no training facilities at all. Uniformity should be brought about by having two types of facilities, viz. Branch Schools for the lower categories to be run at Divisional level and Specialist Schools for supervisory staff organised on zonal basis.

18.9. There should be five general types of Branch Schools, dealing each with Traffic Office and ministerial Staff, Rolling Stock, Electrical and Tele-communication and Civil Engineering. Each of these Branch Schools should train unskilled hands for lower level skilled jobs as well as refresher courses. The schools should be organised on the basis of particular trades and not departments. In addition, diesel and electric loco sheds should continue to have attached Schools as at present.

18.10. For the higher supervisory staff, Specialist Schools are necessary with zonal jurisdiction, one each for Traffic, Mechanical-Electrical-S. & T. and Civil Engineering-Stores-Accounts-Personnel.



18.11. Broadly, the scheme involves one additional zonal level Schools on each Railway, and between three and five Branch Schools per Division. A total of about 330 Schools are, therefore, required as against the 160 at present, but other than nine or ten, most can be put up at low cost without hostel accommodation.

18.12. Possibility of some formal training through mobile training cars also bears serious consideration. This was successfully organised for safety categories on Lucknow Division of Northern Railway a few years back. The experiment was successful and should be taken up by all Divisions.

18.13. In planning of training establishments, size is a vital factor and it should be ensured that no single establishment is forced to handle more than 500 trainees

at a time. An instructor's control should be limited to forty trainees.

18.14. Whereas administratively all these training establishments should be under the Personnel Department at the appropriate levels, it should be incumbent upon Heads of Departments and Branch Officers to regularly visit these establishments, examine the syllabi and suggest updating in accordance with the field situations.

18.15. At present, the Railways are spending about Rs. 9 crores on training which is less than 0.8 per cent of the annual staff wage bill. This will have to be trebled in the first phase to relate it to need-based training. This expenditure, however, is basic to efficiency and productivity.

Annexure A.4.1

(Cf. Para 15.2)

### SCHEME FOR BASIC BRANCH SCHOOLS

Sr. DOS	Sr. DAO Sr. DCS Sr. DPO	Sr. DME	Divisional Personnel Officer (Manpower Resources)	Sr. DEE Sr. DSTF	Sr. DEN	Sr. DME (Diesel)	Sr. DEE (S)*
	Chief Instructor	Chief Instructor	Chief Instructor	Chief Instructor	Chief Instructor	Chief Instructor	Chief Instructor
(1) Divisional School of Traffic & Office Sys- tems.		(2) Divisional Rolling Stock School(s)	(3) Divisional Electrical & Telecommuni- cation School (s).	(4) Divisional Engineering School.	(5) Divisional Diesel Train- ing School.	(6) Divisional Electrical Trac- tion School.	
<b>Traffic Section</b>	<b>Ministerial section</b>						
Promotional re- freshers courses for :  Pointsmen, Leverman, Shunting Zamadars.	Ministerial Staff (All Deptts.) Accountants Sub- heads Personnel and Welfare Inspectors. Store Staff Office equipment opera- tors.	Promotional and refresher courses for :  Wagon artisan staff. Coaching artisan staff. (Mechanical and Elect.) Welders (All Deptts.) Battery main- tenors (All Deptts.) Printers & Sign writers (All Deptts.)	Wireman (All Deptts.) Elec- trical Sub-station Staff. OHE staff Compressor drivers Signal & Telecommuni- cation artisans Instruments & Electronic Fitters (All Deptts.)	Permanent Way and Bridge Mis- tries Work Mis- tries Carpenters (All Deptts.) Black Smiths (All Deptts.)	Diesel Fitters (Mech. & Elect.)  Running Staff (Loco handling)  Machinists  Crane Operators & breakdown staff (All deptts.)  Millwright staff (Mech.)	Locomotive Artisan Staff (Elect. & Mech.)  Millwright staff (Elect.)  Runningstaff— loco handling.	

(1) On divisions where there are no diesel and electric locomotive sheds, there will be no requirement for loco categories. The training of non loco categories can be appropriately distributed to the Rolling Stock and Electrical and Telecommunication Schools in such cases.

(2) Schools shown at 1, 2 and 3 should be generally one per division but the number may be increased as per requirement.

(3) Basic training centres with Advanced Technology wings to be provided separately in workshops



## SCHEME FOR SPECIALIST SCHOOLS

Chief Personnel Officer

C.O.P.S., CCS	CME, CEF	CSTE	CE, COS	FA & CAO
1 Principal, Zonal Traffic/School(s)	2 Principal, Zonal System Technical School(s) (Mech., Elec., & S & T)		3 Principal, Zonal Engineering and Administra- School(s)	
Initial, Promotional and R-freshers for— (a) Higher Traffic Categories (ASMs, Con- trollers, AYMs). (b) Higher Commercial Categories (c) Running Staff (Safety and Operating Pro- cedures).	Initial and Promotional Training for— (a) Mechanical Chargemen (b) Electrical Chargemen (c) Signalling and Telecommunication Inspectors. Refresher for (a) Mechanical and Electrical Supervi- sors (Workshops & Locomotives). (b) Train Examiners (c) Signal and Telecommunication Ins- pectors.		Initial Training for— (a) Permanent Way and Bridge Inspectors (b) Works Supervisors (c) Stores Ward Keepers Refresher and Promotional Training for (a) Permanent Way & Bridge Inspectorxs (b) Work Supervisors (c) Section Officers (Accounts) (d) Depot Store Keepers (e) Senior Welfare and Personnel Inspectors.	

Note.—(1) Need based RPF training schools may be on a regional basis.

- (2) Training for Catering Services may be arranged with external bodies. A special course, once a year, may be specially arranged for Railway staff with a recognised institute.
- (3) All Senior Supervisory staff may also be sent for special courses to the officer-oriented institutes and Research Organisations for advanced subjects, on a limited scale.
- (4) One or two regional Computer Systems Schools to be established alongwith introduction of the Operations-Information System, Passenger Reservation System, and computerised Management Information System for Maintenance, Personnel, Track Renewals, etc.

Annexure A. 4.3  
(Cf. Para 16.12)

Category	Type of Training	Existing Facilities	Additional Facilities required
Unskilled hands Traffic Branch.	Initial	NIL	No physical infrastructure Only induction.
	Refresher	NIL	NIL
Pointsmen and Shunters Jamadars	Initial	Area Schools and Div. Traffic Schools.	Augmentation of capacity.
	Refresher	NIL	An additional school on some divisions.
Switchmen, Livermen, Cabinmen.	Initial	Zonal Traffic School	Capacity expansion in Zonal Traffic School.
	Refresher	Zonal Traffic School	
Train Clerks	Initial	Zonal Traffic School	Capacity expansion in Zonal Traffic Schools.
	Refresher	NIL	Capacity creation in Zonal Traffic Schools.
Guards	Initial	Zonal Traffic School	Capacity expansion in Zonal Traffic School.
	Refresher	Zonal Traffic School	
Signallers and ASM's	Initial	Zonal Traffic School	Capacity expansion in Zonal Traffic School.
	Refresher	Zonal Traffic School	
Yard Masters	Initial	Zonal Traffic School	Capacity expansion in Zonal Traffic School.
	Refresher	Zonal Traffic School	
Traffic Apprentices and Probationers ASM's.	Initial	Zonal Traffic School	Capacity to be increased in accordance with recommenda- tion in paragraph that the prescribed percentage of trainees is made up and adhered to.
Ticket Collectors	Initial	Zonal Traffic School	Capacity to take into account prescribed percentage of graduate trainees.
	Refresher	NIL	Capacity to be built in proposed Divisional School of Traffic and Office Systems.
Goods Clerks	Initial	Zonal Traffic School	Capacity expansion only
	Refresher	Zonal Traffic School	To be catered for in Divisional Traffic School, off-loading the ZTS.



Category	Type of Training	Existing Facilities	Additional Facilities required
Traffic and Commercial Inspectors.	Initial	NIL	To be built in the Zonal Traffic School.
	Refresher	NIL	
Enquiry and Reservation Clerk.	Initial	Zonal Traffic School	NIL
	Refresher	NIL	Not required under Manual System. To be created at a regional school with implementation of computerised system.
Unskilled and semi-skilled staff of Workshops.	Initial	NIL	No physical infrastructure. Only induction counselling.
	Refresher	NIL	NIL
Workshop Artisan Staff	Initial	Basic Training Centres	To be reviewed and developed. Advanced Technology Wings to be set up in one or more Basic Training Centres per Railway.
	Refresher	NIL	
Workshop Supervisor Staff.	Initial	System Training School	To be augmented to include the requirements of promotees from artisan grades.
	Refresher	NIL	To be created in the System Training Schools.
Unskilled staff of all Departments.	Initial	NIL	Induction counselling only.
Carriage and Wagon Artisan Staff.	Initial	NIL	Divisional Rolling Stock School.
	Refresher	NIL	
Diesel and Electric locomotive artisan staff.	Initial	Diesel and Electric locomotive Training Schools.	NIL
	Refresher	Refresher	By augmentation of capacity in the schools.
Ancillary staff (Carpenters, welders, machinists, blacksmiths crane operators etc.)	Initial	NIL	At the Divisional Rolling Stock Diesel, electric loco, or Traffic Training Schools as the case may be.
	Refresher	NIL	
Carriage and Wagon Supervisors.	Initial	System Training School	Capacity to be augmented to include promotees from artisan grades.
	Refresher	NIL	Additional capacity in System Training School.
Diesel and Electric Locomotive Supervisors.	Initial	System Training School	Capacity augmented to include promotees also.
	Refresher	NIL	To be created at System Training School.
Permanent Way, bridges and works mistries.	Initial	NIL	To be created in the proposed Divisional Engineering School
	Refresher	NIL	
Permanent Way, bridges and works inspectors.	Initial	Zonal Traffic School	To be shifted to proposed Zonal Engineering and Administrative Schools.
	Refresher	Zonal Traffic School	
Artisan Staff of S & T Department.	Initial	Limited facilities in a few Sv&T schools.	To be created in proposed Divisional Electrical and Telecommunications schools.
	Refresher	NIL	
Supervisors of S & T Department.	Initial	IRISET and limited number of S & T Schools.	Creation of facilities in System Technical Schools.
	Refresher	S&T Schools	
Artisan staff of Electrical General Maintenance.	Initial	NIL	To be created in proposed Divisional Electrical and Telecommunication Schools.
	Refresher	NIL	
Junior Accountants and ministerial staff of all departments.	Initial	NIL	In the proposed Divisional Engineering Schools.
	Refresher	NIL	
Section Officer Accounts Statistics and Chief Clerks.	Initial	NIL	In the proposed Zonal Engineering and Administration Schools.
	Refresher	NIL	
Junior Depot Staff of Stores Department.	Initial	NIL	Special Courses only.
	Refresher	NIL	In the proposed Divisional Schools of Traffic and Office Systems.
Depot Stores Keepers	Initial	NIL	In the proposed Zonal Engineering and Administration Schools.
	Refresher	NIL	



## CHAPTER V

### TRAINING AND DEVELOPMENT—II

#### 1.0. Introduction.

1.1. Having dealt with the need and programme of training and development for personnel other than officers in detail in the earlier chapter, it would be appropriate now to look in-depth into the Training of Officers.

1.2 At the end, we would also scrutinize the situation relating to the faculty for training schools and institutions, and the methodology of training in general both for staff and officers.

#### 2.0. Officer's training.

2.1. Until 1925 no formal arrangement existed for training of Railway Officers. In the wake of the Acworth Committee's observations a School was opened at Chandausi in 1925 for Traffic and Commercial Officers and subordinate staff, and with this started the formal beginning of officers' training.

2.2. In 1927, in deference to public pressure to allow Indians into the Mechanical Engineering and Transportation (Power) branch of the Railways, a scheme for training Special Class Apprentices was initiated at Jamalpur.\* From the very early stages, however, it became apparent that a much wider interdisciplinary exposure was necessary for Class I Officers and this led, tentatively, to the establishment of a Railway Staff College at Dehra Dun in 1930. Not much headway was, however, made, and with the Depression and the Second World War, attention to this important aspect of Railway Management lost its importance. The concept was revived in 1952 with the setting up of the Railway Staff College (RSC) at Vadodara which is the Premier Officer Training Institute on the Railways today. Later in response to pressing needs an Indian Railway Institute of Signal Engineering and Telecommunication (IRISET) was set up in Secunderabad in 1957, and an Institute of Advanced Track Technology (IATT) in Pune in 1959. Since then there has been no further development and the tendency has been to utilise the staff College Vadodara, as the only non-specialist institution, with an assortment of courses, as and when their need was felt.

2.3. We have given in Annexure A.5.1 the details of the capacity and types of courses of the four Institutes imparting training to railway officers.

2.4. Apart from the four Training Establishments discussed in Annexure A.5.1. for officers, about 40 officers have the benefit of training and exposure abroad every year. This is organised mostly under UNDP and the Colombo Plan alongwith some bilateral arrangements from time to time.

2.5. Of late, the Railways have made much better use of opportunities provided through the Training Calendar of the Department of Personnel. It is learnt

that about 500 training slots are being utilised by the Railways annually. Although the bulk of them consists of short duration seminars, the Railways have been able to avail themselves of a few of the more advanced courses conducted by the Indian Institute of Public Administration, National Defence College, Defence Services Staff College etc.

2.6. The advantage taken by the Railways for training of officers abroad appears to have been limited and perfunctory. There is so much of expertise and knowledge available abroad that a vast organisation like the Railways should find it easy to avail themselves of these opportunities by sending their selected up and coming executives and senior managers from the different disciplines for such exposure.

#### 3.0 Capacity utilisation.

3.1 A matter of some surprise to us is that even in the category of officers, who should be easy to supervise and control, the utilisation of capacity has been poor. The following table brings out the position regarding Staff College, Vadodara.

Table 5.1  
Capacity utilisation at Staff College Vadodara, 1981

Type of courses	Seats		Percentage utilisation
	Offered	Utilised	
1. Induction for Probation Officers	121	68	56.2
2. Orientation Training for Class II Officers (Excl. medical)	408	281	68.9
3. Management Courses	123	61	49.6
4. Special Courses	540	382	70.1
5. Seminars	66	51	77.3
Total	1,258	843	67.1

3.2. The other officer-training institutes do not fare much better. The Institute of Advanced Track Technology has utilisations varying between 70 and 75 per cent, and much the same holds good for the Signals Training School at Secunderabad. We had expected that with a shortfall in the capacity, the training institutes would be over-stretched and remain under constant pressure. What we have found, instead, is that lack of commitment and service discipline, have prevented these institutes from serving even a reasonable part of their potential, and dampened the will to update course content, teaching methods, and expansion to even attainables

\* Presently IRIMEE—Indian Railway Institute of Mechanical and Electrical Engineering.



scope and capacity. There is a general lack of prestige attached to the training function and, the status of teaching and instruction staff is not conducive to attract experienced and competent persons.

#### 4.0. An evaluation of needs.

4.1. Significant gaps exist in the officers training strategy. There is a lack of coverage on many subjects of importance to the Civil Engineering discipline. The Indian Railways Institute of Mechanical and Electrical Engineering at Jamalpur hardly even qualifies to be considered an institute for in-service officers. In fact, the term 'Electrical' is added only because this subject has become an important part of the discipline of Mechanical Engineering on the Railways, and there are no institutional arrangement to train electrical engineers under the aegis of an academic umbrella. Even in the Mechanical Engineering, important subjects like Workshop and Production Technology, Rolling Stock Engineering, Advanced Traction and Manufacturing Systems, far from being taught, have not been developed as a syllabi.

4.2. On the electrical side, the electric traction and OHE\* are not being formally taught. The plight of officers of the Stores and Accounts branches, is perhaps, even worse with instruction largely limited to picking up existing practices and reading departmental manuals. More importantly, transportation has not been seen as a subject with ramifications beyond the mechanics of operation, leading to a lack of institutional thrust for innovation.

4.3. It will not be enough to make up the deficiencies in the training structure if the individual departments alone. There has been a very serious lack of development of the management concept so essential to develop senior personnel for the higher echelons. We have everywhere found evidence of officers incapable or unwilling to look beyond the horizons of their individual departments, and an unconcern for corporate needs. This has led to many obvious negative features creeping into the organisational culture. The setting up EDP@ and MDP@ courses is only the first step in this Direction.

#### 5.0. The tasks ahead.

5.1. We have examined the gaps in training coverage, and have come to the conclusion that the role of the existing units needs to be clearly defined. We consider it desirable that each officer training establishment covers the complete needs of the discipline for which it has primarily been established, instead of limiting its thrust to one or two subjects.

5.2. A perspective plan should be formulated. In the formulation of such a plan, we consider the following issues of overriding importance.

- (1) One training establishment should be evolved primarily as a management Development Institute, in order to give practical thrust to corporate objectives. Amongst its important functions would be to train officers for senior levels with a wide perspective of issues, both external and internal to the Railways, and promote a managerial rather than a departmental culture.
- (2) In order that the Railway officers receive management education of high quality, the

proposed Management Institute should be an autonomous body. The Chairman of the Institute should be part time, and a person with outstanding merit and eminence. The Directors and faculty members may be drawn from both within and outside the Railway on a criterion only of suitability and professional knowledge.

- (3) To set up the Institute initially, the Railways should collaborate with one of the existing Institutes of Management in the country. After it has been set up, this establishment should cooperate with various Institutes of Management and Public Administration available in the country, to set up organisational tasks connected with teaching, research, consultancy etc. The material for the courses should be drawn from the Railways to the extent possible, in the form of case studies, analyses etc. In a sense the Institute would function as a continuous and constructive critic of the Railway Management system.
- (4) All the Officers' Training Institutes should also periodically conduct courses for the Instructors of the Staff Training Institutes, to update their information and knowledge.
- (5) Whereas each of the Officers' Training institutes should be primarily created for one-discipline, it may cover a range of subjects for which officers of other departments may also need exposure. We have envisaged training in electronics, computers and cybernetics to be centralised at IRISSET, Secunderbad, for all departments, courses on traction at Jamalpur irrespective of whether it is diesel or electric, and all aspects of Materials Management at the Institute of Advanced Track Technology and Civil Engineering or the Management Institute, irrespective of whether these courses are for officers of individual departments, or of the Stores Branch itself.
- (6) All Officers' Training Institutes should run regular courses for the technical orientation of senior subordinates to prepare them for handling wider responsibilities on promotion to gazetted ranks. These technical orientation courses should be provided while personnel are in the highest grades of Class III, and not after they have actually been promoted. The ideas is that sufficient training is provided on technical subjects which the supervisor was not required to deal with before becoming an officer. For example, an Inspector of Works would require substantial exposure to Permanent Way and bridge maintenance, a Workshop Foreman to Carriage, Wagon, and locomotive maintenance, and a Commercial Inspector to Transportation. After promotion to the gazetted rank, these persons should do another course at the Management Development Institute, where the course should be oriented towards general executive responsibilities.

5.3. At Annexure A.5.2 we have given a broad plan for core courses at the various institutes both existing and proposed to serve as a guide line.

\* Part II para 2.2.2.

@ Executive Development Programme and Management Development Programme.



This attempts to lay down the minimum coverage subjectwise. It appears to us that a proper scheme for officers training will involve creation of two additional Institutes (Transportation, and Advanced Electrical Systems), recasting of the role of the Staff College, Vadodra, and significant expansion of the other existing establishments, especially the Institute of Mechanical and Electrical Engineering at Jamalpur. Limitations of land and local infrastructure may result in inability to follow this plan fully. For example, there is considerable restraint of space at the existing IATT, Pune, and extensive remodelling and expansion of facilities may create difficulties at Jamalpur. In fact, at Pune, there is no integrated campus and hostel facilities have to be provided several kilometres away.

5.4. Of necessity some capital investment is unavoidable. The Ministry of Railways should not take too conservative a view, based on immediate financial implications. These institutes have to serve very long-term needs and we consider it inefficient and wasteful to build up piecemeal facilities instead of training institutes of the requisite standard. We recommend, therefore, that the Railways should examine long-term needs and take such steps as may be necessary to find new locations, wherever necessary and desirable.

#### 6.0. Location of New Institutes.

6.1. Two additional institutes have been proposed. The location of these is a matter requiring deliberation and care. In the past, the Railways have frequently set up training facilities in small and poorly connected towns. This has resulted not only in trainees sometimes shying away from courses, but has also caused problems in the posting of the faculty. As we shall see later in paragraph 10.1 outstanding senior officers are envisaged as Instructors, and, unless there are proper facilities for their children's education up to college levels, as well as a reasonable social and recreational environment, the Railways will not be able to attract proper persons to man these establishments.

6.2. We consider that these institutes should be at places which are well connected also for the convenience of visiting faculty, especially from outside bodies. The Ministry of Railways should take these factors into consideration in planning the new institutes, or for shifting any of the existing ones, where found necessary.

6.3. The plan given at Annexure A.5.2 is a broad projection only for the core courses. The same institutes should also be required to conduct theme-based courses from time to time to suit local needs. These may be in the form of courses, seminars, special workshops, or even debates. For such programmes visiting faculty should be heavily relied upon and the range of subjects kept wide and flexible. We have found a healthy trend in the past few years, as no less than 265 visiting lecturers were brought to the Railway Staff College, Vadodra in the eighteen months period from January 1981 to June, 1982; of these over half were from outside the Railways.

6.4. A curious feature of these programmes is that they are almost entirely for junior and middle level officers, many of whom have repeatedly been sent to courses, perhaps for lack of suitable placement on the Zonal Railways. On the other hand, senior Officers hardly ever attend. If such courses are to serve their proper purpose and help in stimulating actual improvement in real life situations, it is vital that senior officers are also regularly exposed, if not as students at least as speakers.

#### 7.0. External Training and Advanced Specialisations.

7.1. A large number of highly advanced specialisations are required to buttress the R & D effort. There may not be a regular demand for such special knowledge, and it may not be possible to always identify them in the routine training plan of the Railways. To overcome this difficulty, it is vital to create a proper interface between the R & D perspective and the Training Directorate of the Railway Board.

7.2. The Director General, RDSO, should furnish every year, to the Railway Board, a list of subjects for which no qualified personnel are available, and which are likely to assume importance on account of R & D projects already taken up or likely to be taken up. For instance, a programme to develop high speed capability may require expertise in aero-dynamics, vibrations and high speed bearings. The Railway Board should, therefore, pick up a certain number of relatively young officers to undergo specialised training in leading institutions in India and abroad, to serve in such projects.

7.3. We would also like to comment upon the extent to which expertise can be built up outside the Railways, so that they can off load themselves from an overly diffused programme of Research and Development, and make use of work done by outside bodies. We recommend that the Railways should set aside some funds for advanced and doctoral programmes in the Universities, for subjects which are of interest to the Railways. Many Universities would welcome this additional funding which would not make a dent on the Railways' resources. Over the years this will help to breed lively contact between the Railways and seats of higher learning, which cannot but help imbue greater dynamism to innovation and developmental activity.

7.4. The Universities should in fact, be encouraged to offer some regular advanced courses which have railway relevance. We have particularly in view subjects such as vehicle design, rail-wheel interaction, analysis of tractive and braking forces transportation economics inter-model optimisation etc. and the scope is very wide. Once interest in such subjects is kindled, the Railways will have a ready-made data bank to draw upon, as well as focal points outside for research, and would be able to add considerable punch to their internal efforts at a relatively low cost.

#### 8.0. Training Reserve.

8.1. One of the greatest impediment to progress of training is the lack of an adequate number of posts to cater for training requirements. This results in reluctance on the part of the controlling officers to release their staff for training courses. We have already commented upon the lack of utilisation of training capacity earlier in Chapter IV and Tables 4.3 & 4.4. This is in marked contrast to the Report submitted by an Indian Railway Team on their visit to the Chinese Railways in June, 1982. According to their understanding, one sixth of the total staff strength is at all times undergoing training of one form or another. This may appear excessive in the Indian context, but it highlights the importance given to training in railway systems which report a high degree of productivity in performance.

8.2. The duration of promotional and refresher courses will differ from category to category, but in terms of a broad average, it would appear that about five percent of the staff strength should be provided as trainees reserve to cater for both routine and career development courses. The Railway should study the problem in



detail, bearing in mind that for a large number of categories, and for longer duration courses, this reserve has to be provided in each category, although it may be possible, in many cases, to have them in a lower grade. Trainee reserve for Class IV staff need, however, be provided only to the extent of promotional training necessary. For Class III staff of the artisan trades, while training would be necessary at various stages, the reserve may be provided in the lowest skilled category. Similarly, although supervisors are in various grades, trainee reserves may be in the lowest appointment grades. The reserves should be provided for along functional lines, such as ASMs, Yard Foreman, Workshop Chargeman etc.

8.3. At the officer's level, it is possible to lay down the trainee reserve on a more scientific basis in relation to the various types of courses envisaged. Trainee reserve posts need to be created only for the limited number of courses which exceed ninety days. In the past, there has been a practice for replacements being posted whenever an officer was away on leave or training, for a period in excess of three weeks. This had a certain rationale at a time when the number of officers on the Railways was very low, and there was normally just one Junior Scale (normally Class II) and one Senior Scale Officer in each branch on a Division, and only one Head of Department at the Zonal Headquarters.

8.4. This position has since changed quite dramatically, and it is now generally possible for the next-in-line to look after the duties of any officer who is unavailable for short periods. It is inherent in our recommendation that for all such shorter duration courses, an officer will be guaranteed a return to his original posting, after the course is over. It is only in the case of the longer specialist courses that the Railways may have in view a specific assignment for an officer sent for an uncommon qualification.

8.5. We recommend that trainee reserve posts are provided in the Junior Administrative Grade in accordance with approximate number of longer duration courses planned for Administrative Grade Officers. Apart from this all posts Class I Officers in the Junior Scale should be considered as a trainee category, in accordance with the basic career plan and recruitment strategy.

#### 9.0. Determination of Capacity of Training Establishments.

9.1. We consider it important that the capacity of training establishments is determined on a pragmatic basis, and not be made over ambitious without due regard to the special needs of the academic environment. To enable instructional staff to prepare course material, it is necessary to have a gap of three to four days between successive courses and, once or twice a year, a longer break is necessary to enable instructors to update their material, interact with field managers and attend symposia, workshops etc.

9.2. Having regard to these considerations, we recommend that the capacity of an establishment is determined on the availability of instructors for ten months in a year. This would not only meet the need for small gaps between courses and annual leave requirements, but also enable an annual break of ten to fifteen days for updating of courses and course material teaching aids and maintenance.

#### 10.0. Selection and Status of Instructors.

10.1. During the course of our visits and discussions at various places, we have gained the impression that the selection of Instructors has normally a negative approach, aimed at finding a slot for persons not found very effective in executive posts. This has resulted in lack of care for what should be amongst the most critical of selection on the Railways, and reflects a casual attitude towards the whole subject of training and development. This is borne out by the fact that at the Railway Staff College, Vadodara, the premier officers' training establishments, only two Principals have had tenures exceeding eighteen months over the past thirty years. What could be more illustrative than this? Besides, in the deployment of the Principal, it cannot be said that the quality has generally been the guiding criterion for selection.

10.2. The Railways will do well to take all measures to imbue a greater measure of importance and respect for the training function. We accordingly recommend that the following steps are taken without delay :—

1. Preferably only such persons are posted in the Training Establishments as are categorised 'fit for promotion through accelerated channel'.
2. The tenure of Instructors is for a period of three years, but in no case, should exceed four years.
3. Apart from special pay, Instructors should be given sanctions and compensation to become members of professional institutions, attend symposia, workshops etc.
4. The Principal of the Management Institute should be of a General Manager's rank and, like his other colleagues, considered for elevation to Board Member. The Principal of the other Officers Training Establishments should be of the rank of Chief Administrative Officers/Additional General Managers.
5. The Chief Instructors of each discipline in officer institutions who are now mostly in junior administrative grades should be of the rank of a level I Head of Department, selected ex-cadre from the rank below.
6. In the Staff Training Schools of the Zonal Railways the Principal should be in the Junior Administrative Grade. The Instructors should be in Senior and Junior Scales, and formally promoted from Class III.
7. In the Divisional Schools, the Chief Instructor should be in Junior scale, and the Instructors not below the second highest Supervisor's grade.
8. Whenever necessary, to complete a reasonable tenure, if an Instructor becomes due for promotion, he may be given the next grade in the Training School itself, for periods not exceeding one year.

#### 11.0. Methodology of Training and Course Contents.

11.1. **Duration of Courses.**—We believe that it should be a fundamental philosophy of any in-service training to have the courses as short and concentrated



as possible, so as not to cause undue personal inconvenience and at the same time to ensure they fulfill the objective. Considerable trimming of course duration has been going on in the past few years both at the Officers' and Staff training establishments with this in view. The proposed Directorate of Training, should periodically carry out a critical examination of syllabi and course composition of each training programme. There is definitely some scope, in a few cases, to reduce durations. The refresher course of Traffic Signallers, Locomotive Drivers and Shunters at one month and that of Statistical Clerk of six weeks, by way of example, appear to be excessive.

11.2. It appears to us that there is a misconception of what a refresher course is designed to do. We have, for instance, examined the Drivers' refresher course syllabus and find that it is by and large, a quick run down of the functioning of all parts of a locomotive as well as the various signalling systems, operating instructions etc. It is doubtful if this fulfills the desired objective. To our mind, the refresher course on the technical aspects of the locomotive should be oriented towards trouble shooting. We are informed that at the end of their initial training, all drivers are provided with a small trouble shooting booklet, but frequently fail for perform simple investigative routine in a real life situation, owing to lack of familiarity with individual wires, terminals, contractors etc.

11.3. Similarly the transportation side of drivers refresher courses should be primarily oriented towards safety aspects and the common breach of operating discipline which leads to accidents, derailment etc. The same principle holds good for all categories. The refresher course should be seen as a 'debugging' process and one aimed at the finer points of practice for an already experienced hand. This approach should determine the length of the course and help reduce many of them.

11.4. At the Officers' level, and to a lesser extent for senior supervisors, it may be possible to make the course more effective within the limited time available, if well-defined course material can be sent to the trainees in advance. This is a matter which has to be studied with care, because if the material is too bulky, or requires extensive study, it may be disregarded. On the other hand, too brief an outline may not serve much purpose. The idea is that a trainee should come to the training establishment with some knowledge, and a number of questions in mind, rather than be schooled ab-initio and lead to dialogue and debate. Nomination well in advance is a pre-requisite to such an approach.

## 12.0. Teaching aids.

12.1. Greater reliance on audio-visual techniques and variety of instructional methods can considerably improve the effectiveness of instruction. The psychology and perceptive ability of a trainee vis-a-vis ergonomics is a matter requiring due consideration. It is difficult to hold the attention of a person by either protracted class room lectures or film projection in a darkened room. There should be constant change in a media of communication to stimulate alertness and permit knowledge to sink in. The role of easily-read charts, coloured graphics, models and mock-ups cannot be over-emphasised.

12.2. At the end of a refresher course well-designed playlets can be very effective for illustrating the pitfalls resulting from negligence or non-observance of full discipline in operation.

12.3. To ensure that courses are well-designed, keeping these features in view, it is important that the faculty are themselves exposed to courses on methodology of instruction. For the more each training establishment should be well supported by a small organisation with facilities for graphics, model making carpentry, painting etc.

## 13.0. Simulators and Video Programmes.

13.1. The Committee have been struck by the complete absence of simulators in the Railways training establishments. Present day computer programmed simulators are undoubtedly expensive pieces of equipment, but have come to be considered an essential part of training hardware, whenever a person has to be put through large variety of situations with limited response time. Sequence training and working models cannot—always compensate for real life situation.

13.2 We consider that simulators will be particularly useful for the training of drivers. Variable trailing loads, gradients, speed situations etc., can be simulated, against permutations of signal aspects, time table schedules, track restrictions etc. At the same time, the common track side indicators such as whistling speed restrictions, exchange of signals, have to be observed. In due course it may be possible to feed in a scenario of locomotive instrument readings such as changes in fuel pressure, current rating, train-pipe vacuum, water temperature etc. The Ministry of Railways should plan to procure one Simulator, to start with, by importing it if necessary. The scope of programming for local conditions should be properly provided for.

13.3 Although locomotive crew are the most obvious example of a category that can benefit from simulator training, there are a large number of other types of work where equipment of this nature can go a long way in developing responses whereby optimised operation becomes a reflex action. Section Controllers and Yard Masters are two such categories which have struck us that would greatly benefit by the use of a simulator. This can be widely adopted, at a relatively low cost, in the form of video games.

## 14.0 Continuous Development.

14.1 The whole subject of making training more effective has to be studied for the special requirements of each type of course and category. There are constant developments in the field and it should be the special charge of each faculty to ensure that the Railways keep-up-to-date with such innovations.

14.2 To do so a system of feed back should be established to check on whether the training has been useful and how on the basis of such feed-back revisions and refinements could be evolved.

## 15.0 Special Re-Training Needs.

15.1 In Part II of our Report dealing with Transportation, we had touched upon issues arising out of large surpluses of steam maintenance staff that would arise out of an accelerated phasing-out programme which we have recommended. Earlier in Chapter II of this Report dealing with Manpower Planning, we have also mentioned surpluses that may come about through modernisation of track maintenance and reduction of loads in marshalling yards. The problems of training and development, arising out of wholesale system changes, is of quite a different dimension from those relevant to a steady rate of growth and techno-



logy improvement, with which we have so far been concerned in this Chapter.

15.2 We have suggested\* that an Expert Group should go into the various facets of the problem regarding steam staff. The situation is highly complicated by the presence of a large number of illiterate and semi-illiterate staff who cannot be retrained without going into the field of adult education, and, even then it is not certain that this will be able to meet the demand of newer technologies involving computer systems, numerical-control machines, high speed data transmission and modernisation of traction. Some unorthodox approach will have per-force, to be adopted and hard decisions taken. On no consideration can the Railways be given a modern system of traction or technology with unskilled or semi-skilled manpower.

15.3 In the absence of a viable and worktable programme, we foresee that internal pressures may dilute the drive for modernisation, with the consequence that persistence of redundancies may seriously affect the efficiency and economic health of the Railways. While the Expert Group for steam staff, and similar bodies for other large obsolescent staff groups, would go into the detailed methodologies of placement retraining, phasing and locational particulars, we consider that certain general principles be framed and the Railways take suitable measures to recast Personnel Policy in order to execute a programme, free from strife, litigation and undue hardship.

15.4 Our recommendations in this regard are:

1. The Railways themselves do not enter the field of adult education. They should, however, provide liberal incentives and coordinate with the Ministry of Education to arrange special tailor-made programmes at convenient points.
2. Wherever permanent staff are retrained for alternative trades and require to be put into an existing establishment, the Railways should avoid getting bogged down in problems arising out of inter-seniorities and promotion chances. This can be best achieved by permitting the retrained staff to function in extended pay scales instead of having to compete with the existing staff for higher emoluments. It is only at stages of selection that a formula needs to be adopted to determine the zone of eligibility.
3. Voluntary retirement should be made more attractive for identified categories. The limit of five years' additional weightage for terminal benefits might be raised in the case of such groups to seven years, and, alternatively, special consideration be given to the children and wards of such employees for recruitment into the Railways, provided they meet the minimum qualifications.
4. For a one-time exercise, facilities in various external training establishments should be freely availed of for retraining instead of trying to expand the training facilities on the Railways. ITIs, Polytechnics, Schools of Secretariat Practice etc. will cover a large part of the basic retraining needs, and the Railways may limit themselves to small capsule courses for orientation.

15.5 The time for action is fast running out. It is also time that the Railways appreciated that much has already been lost and delay will only exacerbate the consequences. A well coordinated effort should be launched before the situation gets beyond reasonable control. For example, for a temporary period, the trainee reserve posts can be created out of the redundancies envisaged and should not involve adding to staff strength. Even the capital expenditure on some training facilities can be seen as a part of certain modernisation projects for easy and timely piloting, instead of rushing into unbalanced and disjointed growth.

15.6 Further recruitment in categories where surplus staff can be accommodated should be restricted or stopped for a limited period until the problem of surpluses is settled.

## 16.0 Conclusions.

16.1 The four Officers' Training Institutes in existence do not cover the full range of subjects for officers of all departments. One of the most important gaps is lack of management development. In addition, there is no proper arrangement for Mechanical and Electrical Engineers, and officers of the Traffic, Stores and Accounts departments.

16.2 Despite this, the capacity utilisation even in the Officers Institutes is poor and reflects a dilution in management thinking about the importance of training and career development of officers. This is most tellingly reflected in the general lack of prestige and recognition attached to the entire training function, as also the status and emoluments of the faculties and in the selection and appointment of teachers and professors.

16.3 The Railway Staff College, Vadodara should be developed primarily as a Management Development Institute for training of officers of various departments to hold senior management posts. In order to get best results, and partake of contemporary developments on the subject on a continuous basis, this institute should be made autonomous. Its Chairman should be appointed part time, and should be a person of eminence with a proven track record. The Directors faculty should be a suitable mix between outsiders and Railway officers according to suitability.

16.4 The Institute should be developed by collaborating with one of the Indian Institutes of Management. Later on there should be continuous cooperation with all similar institutions in the country. The faculty should draw much of its subject matter, especially case studies, from the Railways and should function as place of management research and systems analysis for the Railways, and discharge its role as a constructive critic.

16.5 The Indian Institute of Mechanical and Electrical Engineering, Jamalpur should be developed into a full fledged facility for training of Mechanical and Electrical Engineers to provide the full-range of in-service training on all professional subjects. An Institute for Transportation should be set up to provide training in transportation, commercial, marketing and sales promotion. Training of Accounts Officers should be in the Management Development Institute and Stores Officers in one of the other four establishments preferably at IATT.

16.6 Each of the Officers' training institutes should not only run courses for officers in service, but also provide training on professional subjects to senior

\* Part V, Paragraph 3.2, Chapter III,



Class III supervisors before promotion to the gazetted rank. After promotion, they should attend the Management Development Institute at Vadodara on a management orientation course. These Institutes should also provide some capacity to train instructors of the staff training establishments.

16.7 A detailed training plan should be worked out by the Railways, taking into account existing capacities and possibilities of expansion. In case, it is necessary to set up facilities at new places the location should take into account infrastructural facilities available for the faculty and other staff and their wards, and ease of communication for visiting faculty.

16.8 In the scheme of training, insufficient attention has been paid to training of Senior Managers. This is a major lacuna which has to be speedily overcome. The Railways should utilise facilities available elsewhere in India and selectively even abroad to the maximum extent. The present coverage in this regard is very inadequate.

16.9 To ensure that officers and staff are invariably released for training, Trainee Reserve posts may be created to approximately five percent of the cadre strength. This would also cover the courses for relatively longer durations as specified.

16.10 Importance should be given to the selection of Instructors and Professors and preferably such persons should be posted to the training establishments as have been categorised as 'fit for promotion through an accelerated channel'. The tenure should be between three to four years. The Principal of the Management Training Institute should be of the rank of a General Manager and, of the other officers' training institutes that of a Chief Administrative Officer. The Chief Instructors or Professors in charge of a discipline should be equivalent to Head of Department. The status of Instructors or Professors in the Staff Training Schools also needs concomitant improvement. Liberal perquisites and allowances should be extended to the members of the faculty.

16.11 The Directorate of Training in the Railway Board should periodically carry out an examination of the syllabi and course contents of the various training programmes. There is considerable scope for reducing the duration of certain courses while others may have to be made longer to make them more effective. A change of approach to refresher courses is suggested. These courses should essentially deal with the finer points updating of both theory and practice of knowledge, and familiarisation with common failures, instead of trying to run through initial training in a condensed form.

16.12 For some courses, adequate course material may be sent to the trainee in advance in order to dispense with familiarisation with basic information and permit concentration on higher aspects. A variety of teaching-aids and a judicious mix between class room instruction and audio-visual training should be utilised to enliven the teaching.

16.13 Insufficient attention has been paid to the hardware of training. Simulators can be effectively used and these should be first tried for locomotive drivers. Training of many other categories such as Yardmasters, Section Controllers etc. can be oriented to field conditions by the use of relatively cheap video-

games. The methodology of instruction should be continuously researched and updated.

16.14 The retraining needs of vast number of staff likely to become redundant in future needs detailed and urgent examination and should be gone into by an Expert Group. This Group should go into a detailed methodology of placements, retraining, phasing and locational particulars.

16.15 In general, it would not be proper for the Railways to enter the field of basic adult education for the illiterate staff and if necessary, arrangements should be made with the existing governmental agencies.

16.16 Voluntary retirement for certain groups of staff should be made more attractive by additional weightage for years of service.

16.17 To the maximum extent possible, facilities in the industrial training institutes, polytechnics, School of secretarial practice should be availed of for retraining needs, and the Railways should not set up their own facilities for these special needs which require a one time effort.

Annexure A. 5.1

(c.f. para 2.3.)

#### TRAINING INSTITUTES FOR OFFICERS

There are four officers' training establishments on the Indian Railways today. These are:

##### I RAILWAY STAFF COLLEGE VADODARA

The main thrust here is in the core courses, which are:-

1. *Foundation Course for Probationers.* A 12 week course for Class I probationers aimed at providing an overall perspective of railway working, and introduction of the new recruit to organisational culture.
2. *Induction Course.* A six-week course conducted separately service-wise for Class I probationers after they have had sufficient exposure in the field. This is largely oriented towards imparting professional knowledge, but some classroom time is allocated to imparting knowledge in financial management and appreciation of computer systems.
3. *Orientation Course.* This is a six-week course for officers who have been promoted to the gazetted rank from supervisory cadres with view to build up a sense of perspective and executive ability.
4. *Medical Officers' Course.* This is a four-week course to introduce newly recruited doctors to the special needs of the Railways and an introduction to hospital management.
5. *Management and Executive Development Programmes.* In 1981, an Executive Development and a Management Development programme was started. The EDP\* has been conceived for officers who have put in six to ten years service and is designed to give a conceptual frame work of management tools, weaknesses in the various functional areas of railways management, an over-view of the railways,

\* Executive Development Programme.



an element of Personnel Management. The MDP\* is for officers with sixteen to twenty years service, who may be expected to occupy senior administrative positions on the Railways in the coming years. The thrust is on economic development, the governmental industrial, and social environment. industrial relations, finance and marketing. Both the MDP and EDP have been designed as six-week courses, but they have yet to grow into full maturity, the proper requirements, both in terms of time and course content have still to be finalised. EDP courses have since become a regular feature, but the Management Development Courses may have to rely on the British Rail experts who have been inducted to provide assistance, for at least a year or two more.

6. Apart from the core courses, a large number of theme based programmes have been conducted on a variety of subjects. During the year 1981-82, 26 core and 31 theme-based programmes were conducted, the latter ranging between 12 weeks in the case of Advanced Work Study, to as low as 3 days for workshops on work Motivation and Public Relations. A separate course was also conducted for Nigerian Railway Officers. During 1982-83, 21 core courses and 49 theme-based programmes were expected to be arranged including one for Calcutta Tramways and another for Nigerian Railway Officers.
7. Arrangements exist at the Staff College for training around 130 officers at a time.

## II. *Indian Railways Institute of Signal Engineering and Tele-communication, Secunderabad.*

Set up in 1957, this establishment can handle about 300 trainees at a time. Approximately 40 different types of courses are conducted of which six are for officers and the balance for Supervisors, Inspectors and Operators/Maintenance staff. The courses for officers range from six months in the case of probationary Engineers, and one week seminar type sessions for Junior Administrative Grade officers. The courses are under standably protracted for fresh recruits but even for Inspectors being promoted to the gazetted cadre, there is a rather excessive provision of four months. This is in addition to the orientation courses, the employees are expected to under go at the Staff College, Vadodara.

The Institute is the focal point for electronic training which is of growing importance in all facets of railway working. Courses on Basic and Advanced Semi-conductor Technology are being regularly run for officers of the Mechanical and Electrical engineering branches, each being for a well-conceived two weeks.

## III. *Institute of Advanced Track Technology, Pune.*

Eight different courses on Permanent Way and Bridge Engineering are regularly conducted at the Institute. Four of the courses viz., Initial course for probationers Initial course on permanent way for Assistant Engineer, promoted from Supervisors in the Works and Bridges cadres, advanced courses on Permanent Way for officers and advanced course on Bridge technology for officers are of ten weeks' duration, while the others are mostly of shorter duration. In the case of Permanent Way Inspectors promoted as Assistant officers, the course is of eight weeks instead of ten weeks.

While there is no provision of training for non-gazetted staff the Institute has, in the past, conducted courses for Instructors in-charge of training in the Zonal Training Schools of the individual Railways. This is, however, not a regular feature.

The total training capacity is limited to about 50 trainees at any one time.

## IV. *Indian Railways Instt. of Mechanical and Electrical Engineering, Jamalpur.*

Apart from a four year course for Railway Special Class Apprentices, the school conducts only one course for officers and four for Supervisors. The officers course, unlike those at Secunderabad and Pune, is not designed for advanced technical instruction in the complete field of rolling stock engineering, but is a six weeks' orientation to diesel traction. At the Supervisors' level, there is one refresher course each for Shop Superintendents and Electrical Supervisors which hardly scratches the surface of total requirements. The other two courses are one each on Fuel Economy which was first designed for the steam era and the other on Foundry Technology, another losing its wide-spread importance with the reduction of steam maintenance load.

As a measure of economy there is no separate System Technical School at Jamalpur for training of apprentice mechanics of the Eastern Railway. These apprentices therefore receive their three-year class room training in the same school.

Barely 15 officers can be trained at a time.

*Annexure A.5.2  
(c.f. para 5.3.)*

## PROPOSED TRAINING ESTABLISHMENTS FOR EXECUTIVES

### I. *Management Development Institute (Railway Staff College, Vadodara)*

1. Foundation Courses for Probationary Officers of all Departments.
2. General Orientation Courses for Supervisors promoted to Gazetted cadres.
3. Executive Development Programme for Officers with six to ten years service.
4. Management Development Programme for Officers with sixteen to twenty years service.
5. General Courses in Financial Management for all Departments and Advanced Courses for Accounts Departments.
6. Personnel Management, Industrial Relations and Inter Personnel Skills, with Advanced Courses for Officers serving in the Personnel Branch.
7. Training in specific management techniques such as Operations Research, Work Study, Management Information Systems etc.
8. Project Management.
9. Public Relations.

\* Management Development Programme



II. *Institute of Transportation (proposed)*

1. General Courses on Transportation.
2. Advanced Courses on Transportation Economics, Handling and Terminal Strategies, Optimisation, Techniques, including Development of longer-term User Specifications of Rolling Stock, Yard and Station Layouts and operational Parameters.
3. Customers Services, Consumer Research and Commercial Affairs.
4. Marketing and Sales Promotion.
5. Metropolitan Transport.
6. Traffic Research.
7. Technical Orientation to Supervisors promoted to gazetted level.
8. Periodical training to Instructors in Staff Training Schools.

III. *Institute of Advanced Track Technology and Civil Engineering, (IATT, Pune).*

1. Basic and Advanced Courses for Civil Engineering officers-Permanent Way Bridges and Tunneling Works & Structures, Survey, Yards and Terminals
2. Technical Orientation Courses for Supervisors promoted to Gazetted Cadres.
3. Materials handling and Management for Stores Department.
4. Core Training Programmes in Materials Management for Officers of other Engineering Disciplines.
5. Periodical Training to Civil Engineering Institutes of the Staff Training Schools.

IV. *Institute of Advanced Traction & Rolling Stock Engineering (IRISME, Jamalpur).*

1. Basic and Advanced Courses for Officers of the Mechanical and Electrical Engineering Branch-Workshop and Production Technology, Rolling Stock Engineering, Diesel and Electric Traction, Vehicle Design, Preventive and Break-down Maintenance, Electrical Rotating Machines and Control Systems etc. Production and Industrial Engineering.

2. Periodic Training to Instructors of the Staff Training Institutes.

3. Technical Orientation Courses to Supervisors promoted to gazetted level.

*N.B.*—In Part V, we have recommended that a Central Institute for Manufacture, Repair & Maintenance Technology may be set up. This should have a training wing for (i) Courses on concepts of layout, manufacturing systems, service sub-systems etc ; (ii) Exposure and training on latest development on machine tool technology, computer-aided design etc. (iii) Practical training for a limited number of artisan staff and supervisors on the latest generation of production equipment, welding, plasma and laser based metal removal systems, abrasive grinding etc. The nucleus of the specialist operators and millwright staff for the workshops and Zonal Railways will be built up here.

V. *Institute for Signal Engineering, Telecommunications and Electronics (IRISET Secunderabad).*

1. Basic and Advanced Courses for S & T Officers, in both Signalling and Communication Engineering and Practices.
2. Basic and Advanced Electronics Courses for Officers of other Disciplines.
3. To function as a Computer Training Centre in both hardware and software techniques.
4. Cybernetics and Control Engineering for Officers of different Disciplines.
5. Technical Orientation Courses for Supervisors promoted to Gazetted Cadres.
6. Periodical Training to S&T Instructors of the Staff Training Schools.

VI. *Institute of Advanced Electrical Systems (proposed).*

1. Advanced Courses for officers of the Electrical Engineering Branch on OHE Design, Electrification Projects etc.
2. Courses for officers and staff on Electrical general maintenance, Train Lighting etc.
3. Technical Orientation Courses for Supervisors promoted to Gazetted Cadre.
4. Periodical training to Instructors at the Staff Training Schools.

— Depending upon space and other constraints these may be shifted to the Management Institute.



## CHAPTER VI

### INDUSTRIAL RELATIONS AND TRADE UNIONS

#### 1.0. Brief history of Unions.

1.1. The History of the Trade Union movement in India is intimately connected with the Railways. The Railway Companies were amongst the first large undertakings in the organised sector, and provided a natural platform for the labour movement. As early as 1897, an 'Amalgamated Society of Railway Servants of India and Burma, came up on the Great Indian Peninsula Railway as a sequel to a strike by the guards of that Company. Its membership was, however, limited to Anglo-Indian employees, and it did not fit in with our present day concept of Unions as secular organisations, open to all in a class of employees, irrespective of creed, religion and race. Between 1897 and 1919, a large number of unions sprang up on the Southern Marahatta, B.B. & C.I. East Indian, NW, and G.I.P. Railways. Many of these unions cut across staff categories and, therefore, laid the frame work of the broad labour fronts that were a healthy feature of worker collectivisation on the Railways, until the boat was rocked in the early Seventies by category-wise associations.

1.2. The earlier unions functioned in isolation, and there was a growing consciousness that labour was not unified enough to negotiate from a position of strength. With the take-over of Company railways by the Government, conditions developed that were conducive to much greater contact and cooperation between the separate organisations. In 1925, all the unions came together to form an All India Railwaymen's Federation. This Federation continues to exist even today, but events in the intervening period have deprived the railway worker of a unified labour representation, which appears to have been detrimental to the interests of both workers and management.

#### 2.0. Development of Federations-Multiplicity.

2.1. The All India Railwaymen's Federation had developed a membership of 127, 689 by 1929, and, although this fell off to 98,682 by 1934, on account of the cut back on staff and wages imposed by the Railways during the depression years, by the end of the Second World War it had risen phenomenally, and, according to available information, 1949, 525,000 railwaymen had been unionised. By this time, however, a second Federation had come into existence.

2.2. 1947 marked a great schism when, at the national level, the All India Trade Union Congress split up and the Indian National Trade Union Congress was formed on 3rd May, 1947. On the Railways, this separation was reflected in the formation of an Indian National Railway Workers Federation (INRWF) which immediately sought recognition. The All India Railwaymen's Federation retained its more. Over the years, the Railways had accepted the All India Railwaymen's Federation as the single voice of railwaymen, and had been holding regular consultations with them during the War years, with more or less two formal meetings per year. The Ministry of Railways took some time in coming to a decision, but finally, in December 1949,

the INRWF was granted facilities for consultation. By hindsight, this was a mistake, and the source of many unhealthy features that have subsequently crept into the regulation of dealings between management and labour unions. It more or less established the inevitability of the political linkages of trade unions and split the voice of labour. The task of Management, too, became more delicate and difficult, since inter-union rivalry generates pressures against quick and equitable decision making. Both labour and Government, in due course realised that the existence of two Federations as an, unhealthy feature, and have made periodical, but unsuccessful, attempts to bring all railwaymen together under a common trade union umbrella.

2.3. In 1952, unity moves between the I.N.T.U.C and labour representatives of the Hind Mazdoor Sabha, had made considerable headway, and this resulted in the emergence of a single federation for labour on the Railways which called itself the National Federation of Indian Railwaymen (N.F.I.R.). This maturity of approach was, however, shortlived, and became a victim of the multiplicity of political forces that has characterised the country's public life. In 1955, some former members of the A.I.R.F. held a separate convention, which resulted in the A.I.R.F. being revived in August 1957. Considerable efforts were made, by the then Railway Minister, to bring about unity but his efforts were of no avail and, in 1959, the A.I.R.F. was recognised. The parent N.F.I.R. retained its name, and, subsequently, both these Federations have continued to be recognised, barring brief periods when recognition was withdrawn as penal action. A move for unity was again made by the then Railway Minister in 1973-74, in the wake of a series of work stoppages. A conference of Office-Bearers of both Railway Federations and four Central Trade Union Organisations was held on 4th February 1974. While there was considerable consensus on the principle of a single union for one industry, no amalgamation was attempted in the face of highly polarised personal and political positions.

2.4. We were told that of late, attempts are being made to form a third federation by pulling together many category-wise associations which sprang up in the early Seventies. It is important to understand the implications of category-wise associations and unions in the context of the Railway's structure.

#### 3.0. Category-wise Associations.

3.1. In the early Seventies the Loco Running Staff Association suddenly emerged as a militant and highly organised group of special interests, acting independently of the two Federations and their affiliated unions on the Zonal Railways. Not only did they go repeatedly on strike, but also frequently resorted to work-to-rule campaigns and disruption. Their initial success encouraged other sectional bodies, notably the Carriage and Wagon Staff Council, Guards, Signallers, ASM's Associations etc. to rapidly build up a membership base, and resort to an agitational approach for exclusive concessions. Although their strength has considerably



attenuated today on account of a firm management policy, they continue in existence and have periodically taken advantage of a lessening of firmness in management, and the changing political environment.

3.2. Before going on to analyse the causes for the birth of such category-wise associations, which may give a direction for reform, it is necessary to examine if there is a legitimate role for such bodies. With some 700 categories of workers in the Railways, it is patently obvious that sectional bodies and wild-catting associations can destroy the very structure of the Railways, and impair the objectivity of management. There is an inbuilt parity of pay and perquisites between the various categories of staff. This is fundamental to the cohesiveness of an organisation that has such a wide sweep of functions ranging from engineering production, to hospitals, catering and tourism. It is only by having their interests guarded by a common labour front that the integrity of the organisation can be maintained. There are already 80 unions/associations other than those affiliated to the AIRF and NFIR, and any further recognition—normal or otherwise—would negate the very basis of collective bargaining. Some categories critical to operations will inevitably exercise greater pressure and even secure some concession, to the frustration of others that have less clout, which would not be a desirable feature.

3.3. The rise of sectional unions reflects a clear failure of both the existing labour federations and the management. According to the evidence made available to us, the federations had become increasingly dominated by the generally better educated, but non-blue collar categories, and a sense of frustration had begun building up, amongst many staff groups, that their voice was not being given adequate weight. The federations and their affiliated unions failed to see the writing on the wall until it was too late, and the situation had gone beyond control. They, then, took the easy way out, by maintaining an official stance disapproving sectional organisations, but nonetheless turned a blind eye to allowing their members to have dual identity, and participating in both the recognised unions as well as the wild-catting associations. We understand that many union office bearers and active workers took a leading role in the agitations launched by individual categories of workers. To some measure the Federations have been bailed out by a firm attitude of Government in recent years, but our recommendations apart, it is desirable for the federations to take due note of their past history, and take necessary steps to avoid such situations in the future.

3.4. Management, too, has to take a lesson from the predisposing causes that led to wide-spread indiscipline in the first half of the Seventies.\* The case of Loco Running Staff is typical where no effective limit was imposed on the hours of work, in spite of the arduous nature of the job. The Carriage and Wagon Staff worked in some of the most primitive conditions, and, to some extent this situation continues. During our visits we have gathered the impression that the feeling is that Personnel Policy on the Railways has not been given due attention, and often legitimate demands of labour are not uniformly followed. A forward looking personnel policy would, therefore, go a long way in preventing wild-catting labour movements.

#### 4.0. Recognition of unions.

4.1. The principle of one union for one industry is desirable. This particularly so in the Railways, with

such a multiplicity of categories, and the importance of industrial peace in the nation's most vital infrastructural facility. The Wanchoo Railway Accident Inquiry Committee of 1968 saw fit to come on this at same length.

They stated :

"We have carefully considered the pros and cons of having more than one recognised union of workers on each Railway, and consider that not only from the point of view of discipline among staff and the functioning of the administration, but also of the workers themselves, it is advantageous that there should be only one recognised employees' union on each Railway with a recognised federation at the apex. Indeed, the advantage of this has been demonstrated since the derecognition of the second union on many of the Railways after the illegal strike of September 1968. In our tours of the various Railways, we were told by most of the witnesses, including the workers themselves, that industrial peace has been strengthened since that time, and the level of discipline has distinctly improved. We would recommend to the Ministry of Railways to explore ways and means whereby recognition is given to only one trade union on each of the Railways."

4.2. While we endorse the principle of having a single union we realise that much preparatory work would be required to bring the two Federations together, and the initiative would have to come essentially from labour itself. The Railways should, however, examine the norms for recognition of Unions, with a view to avoiding further multiplicity. Although the Railways have not granted recognition to any third Union as a matter of policy, management has been under constant pressure from about eighty Unions/Associations of Railwaymen other than those affiliated to the AIRF and NFIR. With about 700 categories of staff in the Railways, category-wise Unions can multiply endlessly, creating large and avoidable administrative problems and, in the end, defeat the whole basis of collective bargaining.

4.3. Government, in the larger context, has been considering legislation for this purpose and has introduced Bill No 64/1982 in the Lok Sabha on 5-5-1983 to amend the Trade Union Act. With the proposed amendment, it would no longer be possible for any seven persons to form a union, and in the case of an organisation with over a hundred employees, the criterion has been changed to ten percent of the eligible persons or hundred persons, whichever is less. While this would give much-needed relief against multiplicity to the small and medium sector, this still leaves scope for considerable divisions of the labour movement in a giant organisation like the Railways. Whereas the Trade Union Act covers general provisions, it is open to the Railways to lay down, internally, the norms which would enable a Union to legitimately ask for formal negotiating facilities.

4.4. In this context, we recommend that two of the four criteria for recognition to Trade Unions laid down in the Indian Railway Establishment Manual be

\* The industrial relations climate in the period 1978-80 again deteriorated on account of uncertain policies. These were,

however, not related to the unrecognised unions as such.



considered for amendment as follows :

<i>As at present</i>	<i>As proposed</i>
1. They must consist of distinct class of railway servants and not formed on the basis of caste, tribe or religious denomination or any group within a section, caste or religious denomination.	1. They must represent all classes of railway servants and not formed on the basis of any professional category, caste, tribe or religious denomination or of any group within a section of such category, caste, tribe or religious denomination.
2. The Unions must have a membership of at least fifteen per cent of the non-gazetted employees they seek to represent.	2. The Unions must have a membership of at least thirty per cent* of the non-gazetted employees they seek to represent.

4.5. The Committee also learn that Government is considering a recommendation made in a recent (March 1983) Report of the National Labour Conference, whereby only a single 'collective bargaining agent' would be permitted. This would go a long way in keeping a check on the multiplicity of Unions, and, in due course, may help in bringing the various groups of labour together.

4.6. For some time now there has been a widespread view, that a 'Code of Conduct' be enjoined upon the Unions. A recent recommendation of the Sanat Mehta Committee, set up by the National Labour Conference, has made some recommendations in this regard, dealing with the secular character of Unions, the need for dedication and sincerity of workers, and discouragement of sympathetic strikes. As this Report is still under the consideration of the Government we do not want to comment on it. We would, however, say that a regulatory mechanism needs to be introduced regarding dual membership, since this leaves scope for multiplicity of Unions, no matter what other qualifying conditions are laid down. We consider that it would be desirable to make it illegal for any persons who is a member of a Union, to also participate in the activities of any other Union, sectional association etc. This could best be done by a check-off system for verification. To this end, the recent amendment to the Payment of Wages Act, 1936†, permitting managements to recover Union dues through the wage bills of employees, is a welcome step. The Railways have not so far acted on this amendment. We would suggest that they do so in consultation with labour, as a part of an overall understanding on a code of conduct and impropriety of dual membership.

#### 5.0. Structure of Unions and Norms of Functioning

5.1. We have noted that Union activity has proliferated to such an extent that managers are finding it increasingly difficult to perform their legitimate functions. This is particularly true during inspections at outstation points. Officers are unable to do justice to the essential work they are to perform in a field inspection, when they are invariably called upon to meet two Unions in addition to individual representations, and

frequently groups of individuals representing special interests. The smaller branches tend to throw up non-issues and untenable demands, in an effort to demonstrate their strength and justify their existence, since important matters are taken up already at more organised levels.

5.2. We have been informed that even small stations have a union structure representing a handful of staff. The number of branches is not material to a Union's functioning, and we consider that, beyond a certain level, this becomes counter-productive. By and large, railway officers carry out field inspections quite frequently, and although there is much scope to improve the quality of contact with workers, it cannot be stated that they remain aloof and isolated. We find that the major cause for this unsatisfactory state of affairs is a complete lack of control over the number of branches a Union can have, as well as an improperly defined limitation on the number of office-bearers and members who can claim the right of formal and informal meetings.

5.3. We have received evidence both from officers and supervisors, that a large number of railway staff manage to effectively ignore their professional duties, and spend much of their time in meetings, visits and organisational matters concerning union activity. This also causes much resentment to the ordinary worker who finds that peripheral Union activity is far more rewarding than honest hard work. It is our view that even the Central Executive Committee of the recognised Unions, and their senior leaders, would themselves have a sense of relief if some norms could be laid down to limit proliferation of Union functionaries. They find it difficult to do so through self-discipline, because of the competitive situation created by a multiplicity of Unions, and the fear of losing grass-roots support to rival organisations; nonetheless untrained office-bearers of the smaller branches often act independently, recklessly, and even irresponsibly, in contravention of understandings between Unions and management at higher levels, leading to embarrassment and unnecessary acrimony.

5.4. To put the system on a more constructive footing we recommend that the following rules be laid down as a qualifying condition for recognition :

1. The Unions shall be permitted to have branches not exceeding one per 5,000 workers on a division. The location of such branches may be internally decided by the Unions, and, for making a shift, six months' prior notice should be given to the Divisional Railway Manager.
2. The number of executive office-bearers per branch should not exceed five.
3. The office-bearers of the divisional Union organisations may be permitted to be away from work, including outstation, for a maximum of four days in a month.
4. The Branches will function purely for organisational matters internal to the Unions, and shall not have any facilities for negotiations.

5.5. Some of these issues may require consultation with the Unions to work out details. This should lead to acceptance, as the recommendation is aimed at improving the quality of labour-management dialogue.

\* According to the claims of the Unions about eighty per cent of the staff are unionised (AIRF : 738,535 and NFIR : 592, 216 in 1982). With a thirty per cent minimum recognition criterion, there would thus be no scope for a third federation.

† The Payment of Wages (Amendment) Act 1982, in Section

7, Sub-section 2, Clause K.K. permits "deductions made, with the written authorisation of the employee person, for payment of fee payable by him for the membership of any trade union registered under the Trade Unions Act 1926 (16 of 1926)".



## 6.0. Strikes, Lockouts and Productivity.

6.1. In spite of the charters and professed aims of the federations, one of which makes specific mention of improving efficiency, we have not seen much evidence of a visible and demonstrated union profile directed towards raising productivity and efficiency. Some part of this failing may be attributed to a lack of adequate consciousness in the development of Trade Union philosophy. Management too, has paid insufficient attention to the creation of a proper motivational climate, and clear demonstration that there is a direct relationship between individual and group performance on the one hand, and rewards and incentives on the other. Under these circumstances, strikes and disruption of work have been taken more lightly by the average worker than they should have been with a pragmatic policy formulation on this and related issues.

6.2. On an organised all-India basis, there have been three major strikes on the Indian Railways since 1947, apart from innumerable local stoppages of work, go-slows, agitations, and sometimes, widespread indiscipline not extending to an All India confrontation. In July, 1960, railway employees participated in a strike of the Central Government employees on issues arising out of the Second Pay Commission. A strike was called by the A.I.R.F., and it lasted for five days, after which it was withdrawn unconditionally. During the strike only sixteen per cent absenteeism was reported. Recognition of the A.I.R.F. was withdrawn, and restored in September, 1961. The second strike took place, as a token protest, again called by the A.I.R.F., in September 1968, in which 89,000 employees participated. Recognition was again withdrawn, and not restored until October, 1969. The third strike, of May 1974, was the biggest and most widespread on record. It lasted from 8th of May to the 27th of May, and 591,000 employees participated in it for various periods. Once again the strike call was given by the A.I.R.F., who had put up various demands with an implication of about Rs. 450 crores annually. The Railway Administration had conceded a part, involving Rs. 80 crores, but this did not avert the strike.

6.3. With three All India strikes over the past thirty years, the industrial relations climate may at first seem not unduly poor. This would not, however, reflect the real picture. Local agitations, indiscipline, and work stoppages have been frequent. In fact, it is the wild-cattling attitude amongst the rank and file of union members and local branch office-bearers of both unions that has had the most serious repercussion on railway efficiency.

6.4. The effect of strikes and work disruption is not limited to the period of a formal strike situations. For several weeks, and sometimes months, before a strike is launched, Union activists have, perforce, to whip up feelings and magnify all kinds of local issues in order to secure a favourable denouement from the constituents of the strike ballot. This is followed by preparatory work involving an atmosphere of confrontation. During the strikes themselves, sabotage, intimidation and violence have invariably become a part of this activity. Finally, it takes considerable time after a strike has been called off to renormalise the situation. In the Railways a widespread contretemps of this nature has not only a direct effect on internal performance, but a multiplier effect on the lives of people and the economy as a whole.

6.5. Table 6.1 below gives an idea of the productivity indices of the railways during the period 1970-71 to 1981-82.

Table 6.1

Year	Net tonne kilometres per tonne of wagon capacity	Wagon kilometres per wagon day	Net tonne kilometres per wagon day	Mandays lost owing to strike and lockouts
1970-71	15,117	73.4	908	3,27,888
1971-72	15,626	74.1	935	47,361
1972-73	15,717	74.4	953	1,11,270
1973-74	13,950	67.2	837	4,69,129
1974-75	15,186	70.3	907	1,58,21,475
1975-76	16,412	76.8	982	157
1976-77	16,754	81.1	1,019	Nil
1977-78	17,259	81.9	1,045	1,300
1978-79	16,047	75.9	976	76,286
1979-80	16,025	73.3	972	16,527
1980-81	16,285	73.4	986	22,34,361
1981-82	18,366	83.7	1,112	3,054

Source : Indian Railways Year Book 1977-78 & 1981-82. This does not always reflect local work stoppage for brief periods.

It would be seen that whereas the May, 1974 strike continued for barely 5 per cent of the available time during 1974-75, there was a drop of over 10 per cent in the productivity indices in the previous year itself as compared to the levels of 1972-73. This reflects the decrease in efficiency in the pre-strike period mentioned in paragraph 6.4. Much the same happened after 1977-78, until the disciplinary climate once again picked up from 1981 onwards.

6.6. The effect of railway performance on the national economy, and hence the ordinary citizen is deep and pervasive. It directly affects generation of power, production of steel, cement, fertilisers etc., whose inputs cannot be moved by any other mode of transportation. In the past few months many noted economists and eminent public figures have emphasised the close inter-dependence of transport infrastructure with the buoyancy of the economy, and, in particular, the pivotal role of the Railways. The Prime Minister herself has spelt out this symbiotic relationship on a number of occasions, and stressed the role played by the performance of the Railways in the upturn of the economy during the first two years of the Sixth Plan.

6.7. Government, having considered the critical effect of performance of certain core sectors, has enacted an essential Services Maintenance Act in 1981, which gives it powers to prohibit strikes for a period of six months at a time and for a further equal period, if it is satisfied that the public interest requires it to do so. This Act covers the Railways alongwith many other important infrastructural facilities such as P&T, Airports, Seaports, Food distribution, Banking, Oil industry, Water Supplies, Hospitals etc. in the Central Sector. The Act, however, is applicable only for a



four-year period ending 1985. We would like to draw upon the incisive expression of Graham Hutton, a leading economist, made on internal policies. 'If the leading democracies do not, or won't stop the rot in their timbers it will sink them, while other nations sail ahead. It will be poor consolation for their political parties, management and Unions to say, as the ship sinks, anyway the leak was at the other end of the boat'. Some sacrifice on the part of both management and labour is, therefore, necessary for the greater good.

6.8. After many years of stagnation, the Indian economy is now poised for a take-off but this will have to be sustained by internal policies, and an approach that is pragmatic rather than emotive, as it has tended to be in the past. We consider that in the larger interests of the nation, means must be found to extend a much longer period of uninterrupted development in order to bring the benefits of planning down to the level of the common man. This situation has to be tackled by a two-fold strategy :

1. By the creation of a healthy industrial relations climate, responsive grievance machinery, and increased attention to genuine welfare and productivity sharing ;
2. By legislation that empowers the Government to prevent strikes and lock outs for longer periods, along with laying down of a larger number of items for compulsory arbitration, than is the case at present.

6.9. The bulk of this report is devoted to reforms in personnel management to ensure that a railway worker might develop a greater sense of well being and confidence in the objectivity and sympathy of the management. On the other hand, some control is necessary on lockouts and strikes. In view of the most critical nature of the Railways perspective planning during the remaining years of this decade, the funds for which have to essentially come from the Indian travelling public and the tax-payer, it is essential that strikes, work-to rule and other forms of disruption are not allowed to vitiate the developmental process. The desirability should, therefore, be considered, of the Essential Services Maintenance Act being amended to extend it for a further period of five years, and create a proper atmosphere to obviate the feeling amongst many labour circles that confrontation is an unavoidable means to secure betterment. We have deliberated on this issue and appreciate that limiting the options of management and labour cannot be done in perpetuity, since strikes are an integral part of collective bargaining and trade-union activity.

#### 7.0. Continuity of Policy.

7.1. While a longer term legislation on strikes and lockouts is likely to be far more effective than individual declaration of illegality under various Acts and local powers, unfortunately strikes have taken place despite legal restrictions. This kind of a thing is encouraged by a feeling that any action taken against the participants and activists of an illegal strike is of a temporary nature, which is likely to be reversed by a change in Government attitude, even where acts of violence, sabotage and intimidation have occurred. This affects Administration's credibility and has a demoralising effect not only on the management, but also on a vast body of workers who brave social criticism, and even violence, to remain within the law. It is, therefore, desirable that issues arising out of strikes and lockouts, are handled in accordance with legal provisions and uniformity of approach, and not on political considerations.

#### 8.0. Participation of Supervisors in Trade Unions.

8.1. At present, the criterion for eligibility of membership in trade unions is governed by the pay-scale. This by-passes important issues regarding the role and status of an individual, and brings into question whether a person whose function is managerial can be permitted to become a member of a trade union, merely on the basis of emoluments.

8.2. Traditionally, on the Railways, supervisors have been considered the first line of management. The Railways are spread over the entire length and breadth of the country and managers at the gazetted level have been provided only at Divisional/District Headquarters, workshops, and important sub-areas. Over the years, while the strength of the gazetted officers has been increasing, it has not been possible to ensure that gazetted management is provided at each place, or for every function. Even if this were attempted, it would go against the organisational culture of the Railways, and have little chance of functioning smoothly. The running of smaller yards, sheds, carriage and wagon sicklines, permanent way and signalling sections etc. is, therefore, managed by supervisors in various grades. These supervisors are not merely technical controllers, but have, in the past, exercised very important functions of personnel management.

8.3. The Supervisor was traditionally the first line of management on the one hand, and a father-figure to his staff on the other. Over the years, with increasing militancy of labour and the unfortunate lack of support given to the supervisors by the Railways, they have been caught up in vice that has resulted in gradual erosion of their traditional role. To look after their interests they have been finding it easier to become members and office-bearer of trade unions, with the result that it is no longer possible for them to be really free from prejudice amongst staff belonging to different unions and other non-recognised associations. At the same time, management can no longer rely on the unquestioned impartiality and professional approach at its lower rungs. This has been pointed out to us everywhere we have gone.

8.4. We, therefore, recommend that supervisors, at levels beyond first appointment grade, should not be permitted to join trade unions, or retain membership if they are already members. It may not be possible to extend this principle to the first appointment grade also, because fifty per cent of the entry to the latter is of departmental candidates from lower Class III posts, who frequently function, ad hoc, for limited periods before final selection. It may, therefore, be impracticable to enforce the ban at a level where many persons are only temporarily working as supervisors, and in some cases may have to revert.

8.5. These Supervisors would, however, need a forum to voice their problems and negotiation facilities to safeguard their interests. To this end, the Railways should permit them to form a Federation on the same lines as the Officers' Federation, with facilities to meet management both at the Zonal Headquarters and at the Railway Board level, at suitable frequencies.

#### 9.0. Collective bargaining and negotiating machinery.

9.1. As early as 1929, an ad hoc meeting had been held between the A.I.R.F. and the Railway Member of the Government of India, in the face of a threatened strike. During the War Years, a system of regular



consultations had been adopted, owing to the anxiety of Government to ensure that no disruption to the War effort was allowed to take place. In a sense, therefore, joint consultation had established itself on the Railways many years before Independence. This had, on one occasion, led to a Tribunal\* in 1932 when the Railways had cut down on wages and employment as part of an economy drive. The A.I.R.F. had been caught in a difficult situation. On the one hand, it could not ignore the set back to labour fortunes, and, on the other, the firm approach of Government and reduced membership base during the depression years, were not conducive to a confrontation. It found a way out of the situation by threatening a strike in 1931, but simultaneously prevailing upon the Government to appoint a Court of Enquiry. This marked the first attempt at formation of a tribunal. For the sake of the record, Justice Murphy, to whom the matter was referred, upheld the Government's stand.

9.2. After Independence, Unions pressed for setting up of Joint Consultative Committees, and the A.I.R.F. took a strike ballot on 6-7-1951, presumably to force the issue. Consultations between the Government and the A.I.R.F. however, led to an agreement for setting up a Permanent Negotiation Machinery (PNM) and it started functioning from 1-1-1952. This preceded, by fourteen years, the more general Joint Consultative Machinery set up by the Central Government. This underscores the much longer tradition of consultative management on the Railways.

9.3. The PNM functions at three levels—the Divisional HQs, Zonal HQs, and the Railway Board. Sometimes it leads to a Tribunal. At the first tier, the recognised Unions have access to the Divisional Offices headed by the Divisional Railway Managers, as well as the Headquarters Offices headed by the General Managers. Union Office bearers meet the Divisional officers under the aegis of the PNM, and items which cannot be mutually settled at this level, or are otherwise of a more general interest, are taken up by the central executive committee of the Union at the Zonal Headquarters' level.

9.4. At the next level, the Railway Board meets the two Federations on a regular basis and, finally, where the Railway Board and the Federations are not in agreement, reference can be made to an ad hoc Railway Tribunal.

#### 9.5. Joint Consultative Machinery.

While the Railways had gone ahead with the setting up of Joint Consultative Committees, little headway was made for the remaining Central Government employees. In the back drop of July, 1960 strike of Central Government employees, it was finally decided to implement the recommendation of the Second Pay Commission to set up Whitley-type councils, with a provision for compulsory arbitration. Accordingly, a scheme known as Joint Consultative Machinery (JCM) was inaugurated in October, 1966.

9.6. The scheme was framed on a 3-tier basis, consisting from the top, of a Joint National Council, a Joint Departmental Council and a General Regional/Office council. Owing to the Railways' having set up their own machinery (see paragraph 9.2) as early as 1952, they decided to participate in the scheme only at the National and Departmental levels. The scheme provides for compulsory arbitration on three subjects only viz., Pay & Allowances, Hours of Employment, and Leave Rules. Since 1969, the Ministry of Railways have been holding three meetings annually, in which

representatives of both the Federations sit jointly on the staff side.

#### 10.0. Duplication of Arrangements.

10.1. The situation that exists on the Railways today is that the PNM functions at the Divisional/Workshop level, Zonal Railway level and Railway Board's level with a provision for reference of cases to a tribunal, as well as Joint Consultative Machinery functioning at Railway Board's level and the national level, with its own provision for compulsory arbitration. There is, therefore, a duplication of arrangements at the Railway Board's level at which the two Federations sit jointly for discussions with the Railway Board's, while still retaining a forum to discuss issues separately also. In order to examine whether such a duplication is healthy and essential, or a more efficient arrangement can be made, we consider it necessary to make an appraisal of the functioning of the machinery and its effectiveness as far as the Railways are concerned.

#### 11.0. An Appraisal of Permanent Negotiating Machinery.

11.1. The Permanent Negotiating Machinery is, in theory, a healthy feature, and in the absence of other arrangements would have a major role in maintaining harmonious labour relations. Our investigations have shown, however, that it does not function as smoothly as may be expected, and often results in mutual suspicion, a feeling that the other party lacks commitment or bona-fide intentions, and this itself has become a source of acrimony. The problem is particularly noticeable at the Divisional level. A glance at the statistics would readily explain the limitations of the system. According to figures made available to us, on an average five to six hundred items are being taken up every year in a Division, and fifteen to twenty percent have to be pushed up to the Zonal level, where, other items are directly introduced by the Central Committees. Once again, ten to fifteen percent of the items at the Zonal level are further referred to the Board level machinery.

11.2. It had been conceived that individual cases or grievances were to be eschewed, and the PNM was primarily created for a kind of continuing dialogue on matters relating to policy, interpretation of rules, and issues with wider ramifications. We have found, instead, that a very high proportion of the items introduced by the Unions refer to individual cases, and, at the Divisional level, these contribute almost the full agenda. What appears to be happening is that instead of normal grievance machinery being allowed to function, all matters are being diverted to a forum which is not geared for this purpose. Over and above the formal meetings, take place, at random, consuming a great deal of the time of the Branch Officers and Senior Managers, and we get the impression that a vast number of railway staff are able to get away without doing any constructive work on grounds of union activity.

11.3. An examination of the delegation of powers reveals, and perhaps rightly, that there are few policy issues capable of a decision at the Divisional level. In the concept of Joint Consultation as applicable at present there would not be a requirement of such machinery below the Zonal level. However in the case of the Railways and in the light of long standing practices we consider that a forum for dialogue between labour and management at the Divisional level is necessary. Efforts should, therefore, be made to make discussions more purposeful and constructive, which can best be done by streamlining grievance machinery; to filter out minor

\* The term tribunal is used in a wider sense. Officially it was called a Court of Enquiry.



issues and simple individual cases, by good follow up in the various executive branches and the Personnel Branch itself. Later in para 11.5, we have recommended the replacement of the PNM by the JCM, and extending it to the Divisional level. It is hoped that with both unions sitting together, the level of discussions would gradually rise to issues of general applicability rather than individual cases.

11.4. Even at the Zonal level, we find that many items continue to figure for extended periods because of lack of follow up action. The Railways must appreciate that, having set up a forum for regular dialogue, it must be given due attention. There is an interval of two months between meetings with each Union, and, therefore many of the matters should be capable of being resolved in the intervening period. To this end, we suggest that the Personnel Branch is internally re-organised to provide for an officer-oriented system with a special cell for Industrial Relations, manned at an appropriately senior level.

11.5. As it is essential to eliminate duplication of arrangements, we recommend that the institution of JCM should be retained on the Railways and made applicable at all levels. As the areas covered by the JCM and PNM are the same, this will make arrangements simpler, more workable, and avoid duplication. Under this arrangement, PNM will be abolished in favour of JCM at all levels. This would help in establishing a single voice of labour, reduce the time involved in formal consultations, and bring about greater purpose and edge to the while process of consultative management.

#### 12.0. Tribunals.—

12.1. Over the past 30 years, a Tribunal has had to be convened under the PNM on four occasions. The first was set up in 1953, but during the currency of its deliberations, three out of five demands were directly settled between the Railway Board and the Federations. The Tribunal Award on the other two issues came only 9th 1959 and took another three years to plimentment fully. The second Tribunal was constituted in 1969 and gave its Award 1972 which was implemented with commendable despatch. The third Tribunal, set up in 1972, however, took eight years to give its Report. All these Tribunals were one-man bodies and both the Administration and Labour had waived their right to be represented. The fourth Tribunal the Railway Workers (Classification) Tribunal, however, was a tripartite body and ran into many difficulties. The labour members did not accept the Chairman's views and many issues had to be directly re-negotiated.

12.2. Clearly, the first attempt to have a broad-based Tribunal has failed. We would recommend that the Railways return to the concept of a one-man Tribunal in future. The Tribunal should, however, be invariably headed by an eminent serving or retired member of the judiciary. The idea of a Tribunal is that when two parties fail to agree they accept the binding verdict of a third impartial arbitrator. If the arbitration body itself is to consist of representatives of the opposing sides, this merely results in carrying on the lack of compromise to a higher plane.

12.3. We are also constrained to note that sometimes the Tribunals have sat for an excessively long period. There is a danger in such prolonged deliberations, as it gives an excuse for much genuinely needed reform to be swept under the carpet. Some of the issues that come up before Tribunals are undoubtedly complex and require establishment of a data base which may not readily exist. Later, in Chapter VII, we have recommended the setting up of a cell for Personnel Research on the Railways. This, apart from other advantages, would help to cut down the lag, and enable Tribunals to function to a time-bound programme.

#### 13.0. Grievance Machinery.—

13.1. We consider that the single most important step towards creation of a better industrial relations climate is the functioning of a streamlined and responsive system of grievance handling. This assumes added importance with the PNM being discontinued. Staff may not be willing to accept the abolition of what they believe is an established form, unless it can be demonstrated that the alternative arrangements are adequate.

13.2. Data collected from various sources reveals that over fifty per cent of the representations from staff relate to non-payment of dues. We, therefore consider, that if preventive steps are taken, the size of the problem will be considerably reduced. One cause for the accumulation of non-payment cases is the revision of pay and allowances with retrospective effect. We appreciate that it is not always possible to avoid this because payments may become due before the data necessary to implement decisions gets fully collected. We recommend, however, that as a general principle, payments should be given effect two months from the date of issue of orders, and for the retrospective period involved, ad hoc lump sum payments may be made\*. This procedure was effectively adopted in 1981 with regard to the revised scheme of Running Allowances. Two months is an adequate period for orders to percolate down to field formations and preparation of documents for billing purposes.

13.3. It is also essential that the service records of staff are always up-to-date and are not allowed to go into unmanageable arrears, if grievances are to be handled speedily. A great deal can be achieved by mechanisation of procedure, and we shall be dealing with computerisation of Personnel Management in a subsequent Report. Even without sophisticated aids, it is essential that personal records are given the importance that is their due as the basic tool of man management. This should be the special charge of the Personnel Branch and it should be a part of the duties of the Personnel Inspectors\* to review the contemporaneity of personal data for the staff in their charge.

13.4. To cut down the time lag for payment and eliminate inefficiency and buck passing, we consider that the present practice of double handling of staff payment bills, first in the Personnel Branch and then again in the Accounts unit, should be altered. Having regard to the practice in industry, both in private and public sectors, we find no reason why the bill checking†† work cannot be transferred to the Accounts Department. Adjustment of posts and other details may be worked out to ensure that the changeover is smooth. Staff grievance

\*The idea is that the two month period is used to make the point to point fixations of each individual worker, and for the previous period fixed sums are paid by bracketing a number of workers in pay ranges. This would eliminate delays in payment.

A clear distinction has to be drawn between Personnel and Welfare Inspectors. Chapter VII deals with this issue in detail.

†† We have found that the Personnel Officers exercises only a 1% sample check of bills prepared by the controlling officers. This obviously serves no purpose and is an unnecessary tier. The bills should, therefore, be passed direct by the Accounts Branch with appropriate check.



handling is of such importance however, that some strengthening of the billing sections in the Accounts Branch may be resorted to without taking too conservative a view of the additional financial burden. We have emphasised large areas of manpower redundancies in various Reports. It may not therefore be necessary to increase the total manpower on this account.

13.5. We shall be dealing with the role of Personnel and Welfare Inspectors more fully in Chapter VII. It is important, however, to underline their function as not merely one which mechanically processes staff representations, but which also provides an important aspect of grass-roots communications. They should be in constant touch with staff and explain what is due to them and what is not admissible. We find that there are in existence, already, Staff Assistance Bureaus in some of the Divisional offices and workshops. Some of these are reported to be doing fairly good work. To make their functioning, and that of the Personnel Inspectors more effective, the officers of the Personnel Branch should audit their performance, both quantitatively and qualitatively. They must shed the passivity which is so evident today. Cases get unjustifiably prolonged at each stage of the grievance machinery and this is explained by stating that a ruling is awaited from the competent authority. This form of lassitude is only evidence of lack of vigour in the system. It should be the special charge of senior officers such as the Divisional Railway Managers or Additional Divisional Railway Managers to ensure that Personnel Management receives the same kind of audit as operations or maintenance.

13.6. In Chapter VIII, we have recommended restructuring of the personnel branch by bringing all day to day matters under the executive officers. This is primarily aimed as a measure to ensure better grievance redressal, more responsiveness, and personnel attention from the management.

13.7. The public image of the Personnel Branch of the Railways, is, unfortunately, of a very low level. Over the years, cumbersome administrative procedures and undue reliance on clerical approaches have become an integral part of the system. Under these conditions, all the changes envisaged in altering grievance procedure, re-delegation of authority etc. will have to be preceded by an intensive public relations campaign by the Railways for the benefit of their staff. Organised labour should be taken into confidence and their co-operation sought in making the changeover smooth and effective.

13.8. The procedures followed by the personnel department have not been reviewed through any scientific study in recent years. This should be done and include studies of manageable spans of control, methodology of work, cross linking of data and movement of files on the basis of sound industrial engineering principles.

#### 14.0. Administrative Tribunals.

14.1. A very large number of cases arising out of staff grievances are finding their way into courts of law. Legal redressal is time consuming, costly to both sides, imposes a heavy financial burden on the aggrieved, and frequently places impediments in day-to-day working of the administration. We fear that if this tendency is not reversed, it will some day bring the entire administrative machinery to a halt. In line with the practice in some developed countries, we recommend that a separate Tribunal be created for service matters. No appeal against a Tribunal's decision should be provided, other than in the Supreme Court. This may require legislation and concurrence of several Ministries of the Government of India. It may, therefore, take time but the matter nonetheless, is worth serious consideration.

#### 15.0. Conclusions.

15.1. The multiplicity of unions has to be discouraged. In the recent past many category-wise associations have come up and have been able to exercise undue pressure. There is no legitimate role for such organisations as they vitiate against the concept of collective bargaining, and are neither in the interest of workers nor management. Both Unions and Management have to learn from past mistakes which encouraged the formation of such bodies.

15.2. While a single Union is desirable, this cannot be enforced on labour and the initiative will have to come from the workers themselves. In order to discourage further multiplicity, however, the rules regarding recognition of Unions should be altered in two important respects. Firstly, the qualifying conditions should, stipulate that the Union must represent all categories of Railway workers. This would automatically debar any factional organisations from seeking negotiating facilities. Secondly, the criterion for seeking recognition should be raised to thirty per cent of all non-gazetted employees as against fifteen per cent at present. Furthermore, a Code of Conduct should be negotiated with two recognised Railway Federations, whereby dual membership of any kind would not be acceptable. In order to do so, a check-off system is necessary, which can be organised by deduction of union dues from wage bills. This has lately become permissible through an amendment to the Payment of Wages Act.

15.3. The number of branches that each Union can have on a Division should be limited, and norms laid down. The branches should function for organisational matters, and not for negotiations with management which should be limited to the Divisional level and upwards.

15.4. A continued period of uninterrupted productivity gains is required on the Railways in the interests of National Development. The Railways should improve their grievance machinery, and some additional items may be brought into the list for compulsory arbitration, during the period that strikes can be declared illegal. Government should consider extending the Essential Services Maintenance Act for another five years.

15.5. Supervisors cannot appropriately be allowed to be the members of the trade unions. They should therefore, be allowed to form a separate Association.

15.6. There is duplication of arrangements on the Railways for joint consultation. Whereas all Government Departments function under the JCM, Railways have also continued an earlier scheme of Permanent Negotiating Machinery. The latter should be now abolished in the interest of rationalisation and the Railways would thus fall in line with other Government Departments.

15.7. In order to streamline the grievance machinery special attention should be paid to the payment of dues. Generally, orders should have a prospective effect only, to cut down the payment time, and ad hoc payments made for past periods. A single agency should deal with staff payments and, therefore, routing of bills through the personnel department should be discarded in the checking system. Service records of all staff should be kept up-to-date and Senior Management should ensure that the Personnel Department receives the same kind of continuous audit and attention as is given to other major disciplines.

15.8. Administrative Tribunals should be set up for service matters in order to eliminate protracted and costly legal proceedings.



## CHAPTER VII

### PERSONNEL DEPARTMENT : ROLE AND STRUCTURE

#### 1.0. Introduction.

1.1. We have been concerned with the question whether the Personnel Department has an internal structure, and interface with the executive branches, conducive to sustaining a forward-looking and dynamic personnel management policy. It became immediately apparent to us that concepts of personnel management, as against simple establishment administration, have not received due attention despite the fact that the Railways are the largest and one of the most labour-intensive organisations in the country. This is an opinion voiced by Trade Union Officials, workers, Railway officers, and even many knowledgeable persons from user groups.

1.2. In the past few decades big strides have been made in the techniques of personnel management elsewhere, both in India and abroad. Development of a modern personnel department, staffing it suitably and clearly defining its role is long overdue in an organisation which has otherwise seen much change and technical advance in the past thirty years, and where much more has to come. To our mind, it is one of the urgent needs of the Railways and one that would have far reaching effect on its productivity and efficiency. Recently an Indian Railway Personnel Service has been introduced as a separate cadre, with the idea of developing specialisation in this field. We get the impression that this has been seen as a panacea for existing ills. The more basic reforms have, in fact, been left untouched.

1.3. To examine the structural changes in the Personnel Department that may logically suggest themselves we have found it helpful to spell out the major weaknesses in personnel management on the Railways. In the individual chapters, both preceeding and later in the Report, we have identified a number of critical areas of inadequate attention in human resource management that have come to our notice, during our visits and discussions. Briefly they are :

1. Lack of an integrated approach to manpower planning and recruitment.
2. Inadequate training both qualitatively and in content, and little attempt to tie up induction, promotional training, refreshers etc. with organisational objectives and career planning.
3. Improperly managed grievance-handling machinery and passivity in matters relating to the individual worker.
4. Industrial relations dependent on bargaining on individual issues raised by unions as they come up, instead of a well researched dialogue with labour on the basis of a long term perspective.
5. No organised attempt to put personnel systems, service records and other data on a more efficient and purposeful footing.

6. No system of counselling to employees and analysis of performance appraisals.

7. A failure to view development of the human resource base, its motivation, and morale, as vital to corporate objectives, and deserving of priority consideration.

1.4. The list is not complete, but it represents key areas for a new outlook. We have had these issues in mind in suggesting altered structural arrangements for the personnel branch later in this Chapter.

#### 2.0. The Personnel Cadre.

2.1. To tackle the deficiencies brought out in paragraph 1.3 above, it is necessary that the persons involved with personnel affairs have adequate background, knowledge, and an intimate feel for organisational culture. We are of the opinion that these attributes should form the basic criteria of deciding how the Personnel Branch is staffed, both at the higher levels which are to initiate and execute systems changes, and at the lower rungs where much of the routine work is done.

2.2. Traditionally, officers of various disciplines, especially Civil, Mechanical and Traffic, have been posted to work in the Personnel Branch for limited tenures. The system had some merit, but, as implemented, it increasingly failed to deliver the goods. Partially, this problem is on account of the reluctance of Departmental Heads to spare good and competent officers for serving outside their cadres. The existing role and general status attached to the Personnel Branch is of a nature that officers themselves have not been keen to serve in this Department. The result is that over the years, the number of officers being promoted from Class III, into the officer cadre of the Personnel Branch has increased out of proportion to the cadre strength.

2.3. Every year, an average of about 100 ministerial staff are being promoted as Assistant Personnel Officers, and the number appears to be on the increase, having reached 140 in 1980-81. A check on the Northern Railway has shown that less than ten per cent of the officer strength of the Personnel Department comprises directly appointed Class I Officers. Furthermore, we have found that almost one-third of the total strength is being drawn every year from fresh promotions of Class III staff (Out of a total of 67 officers in the Personnel Branch on the Northern Railway in 1981, 23 had been promoted in 1980-81 alone). Class I Officers were almost entirely limited to the higher administrative grades in the Headquarters Office. This is unfortunate as ministerial staff do not have any significant exposure to labour or their field problems.

2.4. Moreover, these new promotees generally retire before they have got properly into the groove and re-adjusted their outlooks. There is, thus, poor continuity



in the branch as a whole, let alone in any individual post. It is fair to say that promotees in this Branch do not have enough service to treat their tenures as anything but a pre-retirement period of personal planning.

2.5. The system of manning has, therefore, become ineffective. Furthermore, with persons coming for a relatively short tenure, there is no organisational commitment to a long-term improvement of procedures, development of desired perspectives and an urge for innovation. There is no doubt that entire postings of Class I Officers in the Personnel Branch have led to local improvements, but such postings have now become rare. The profile of the branch as a whole has deteriorated over the years, and there is urgent need to rehabilitate the department by finding means to secure the services of younger, competent officers who appreciate the need for longer term amelioration of personnel practices, and can contribute to the evolution of correct policies.

### 3.0. The Indian Railway Personnel Service.

3.1. The Personnel Department on the Railways has a very definite and important role and has to have its separate identity. The question arises how it should be staffed. We have later discussed in paragraph 4.0, the staffing of the non-gazetted cadres in the Personnel Department and have made specific recommendations. As regards staffing of officers, lately an Indian Railway Personnel Service has been formed to which direct recruitment of officers has already commenced. We have found that such a step was taken earlier also by the Railways, but given up.

3.2. As early as 1945, a separate Personnel Service was formed, but this was discontinued after the recruitment of two batches, and the officers distributed over the other cadres. In the Seventies, a consensus that the demands of Personnel Management were becoming increasingly complex, and the industrial relations climate steadily deteriorating, led to a revival of interest in the concept of a separate service. The Indian Railway Personnel Service was once again formed in 1976. Initially officers of various disciplines were given an option to shift to the new service. The response was not encouraging, since there was no signal to the serving officers that a sea change in the role and status of the Personnel Management would be under way, and their career prospects would be satisfactory. By and large, individual officers tried to determine how this would affect their service prospects, and, to a substantial measure, the few that gave their option did so in the belief that this might improve their promotional chances over what they expected in their parent cadres. Subsequently direct recruitment to the Indian Railway Personnel Service has commenced in 1980.

3.3. Certain misgivings have been expressed from various quarters about the formation of a specialised Personnel cadre relying on direct recruitment from the very beginning. The fear is that in due course a department so staffed, would develop an insular stance, and an inward looking culture. Unless they are properly trained and exposed to field conditions, there is a possibility that officers of such a cadre may lack an intimate feel of the field situation and, therefore, not be in a position to provide the right leadership. This fear cannot be dismissed, but on the other hand, there are clear advantages in having persons specialised in the field of personnel management with a good knowledge of labour laws, rules and modern management practices we, therefore, feel that the Indian Railway Personnel Service having been set up, it should be given a fair trial before

any basic or fundamental change in the staffing arrangement of the Personnel department is considered. The service prospects of IRPS officers have also to be worked out in some detail.

3.4. The Indian Railway Personnel Service is still in a state of infancy. It will take many years before an adequate number of Class I Officers become available to man the various posts. In recognition of this deficiency, the Railway Board has permitted fifty percent of the entry into Class I by promotion from Class II, as against forty percent in other Services. In the opinion of the Committee this is an incorrect decision, and will only perpetuate the many ills of the Personnel Branch that we have discussed in paragraphs 2.3 and 2.4.

3.5. The Railways should make a rational assessment of the efficacy of specialised IRPS before deciding to confirm, modify or cancel the scheme. For this purpose, we recommend that the bulk of new recruits should be posted to two or three earmarked zones and the performance of these zones compared with those of the other zones with non-specialised staffing. This comparison can be done after an experience of four or five years (say in 1987-88). The recruitment into IRPS should accordingly be adjusted to this requirement over the next few years.

3.6. While there is a specialised Personnel Service, it is important how the recruits into this cadre are trained. A proper scheme should be evolved to ensure that probationers entering the services are given sufficient exposure to the functioning of the Railways at the field level. We have gone through the syllabus of training of IRPS probationers, which was formulated in May, 1981 for the first time. The scheme is well thought out in many respects, and includes exposure in professional institute outside the Railways and other public sector organisations. Twenty-five weeks have also been provided for attachment to various executive departments of the Railways, and there is, in theory, a balanced exposure both to professional subjects and organisational matters. We get an impression, however, that during their field attachments, probationers will be left to their own devices and there is, therefore, a need to have a better check on their training progress.

3.7. We consider that field training of IRPS probationers should be directly supervised by experienced officer who will ensure that the trainees are brought into intimate contact with real issues in the field. Some of the important details we have found missing or inadequately represented in the training syllabus are :

1. Foot-plating on locomotives and staying overnight in running rooms along with Drivers and Guards. This will give them a good idea about the issues arising out of hours of duty, boarding and lodging arrangements in running rooms and the many social tensions that arise from this difficult aspect of service and management;
2. Accompanying permanent Way Inspectors for track inspection, including the system of attendance checks, payment, etc. for gangmen who are often illiterate and isolated from large stations, offices etc.
3. Night shift-work in yards and other establishments which function round the clock, and the considerations involved in drawing up rotating rosters ;



4. Probationers should be asked to conduct some meetings of Area Housing Committees, welfare bodies and Union negotiation etc. during the training periods; and
5. An early exposure to Management Information systems, specially the use of computers and electronic data processing for Personnel Management and service records.

3.8. Even with all these changes, adequate thought has to be given to the relationship between a specialised Personnel cadre and the executive branches, and the prime need for the Personnel Department to function as a service in support to the executive officers who actually have to run the various departments. We have dealt with this issue later in paragraph 5.

#### 4.0. Non-Gazetted Staffing.

4.1. In paragraph 5.0, we will deal with the structure of the Personnel branch. It will be apparent from it that this may mean an increase in the number of personnel officers and the specimen charts will indicate clearly how the officer oriented system will function in practice. Similarly, it may mean expansion of the Personnel and Welfare Inspector categories. Simultaneously, there has to be some concomitant reduction in the size of the ministerial staff of the department.

4.2. We will be dealing with computer applications for personnel management in a subsequent Report. Even without the use of advanced computers, there is considerable scope for mechanisation of office systems, scientific data storage and retrieval, rationalisation of personnel procedures, and shedding of a great deal of the fat or 'tail' from the Personnel Establishment. Much of the personnel functions would devolve upon the branch officers with the assistance of Personnel Officers serving directly with, and under, them. This would reduce spans of control and clerical inputs. Reduction of the ministerial staff base is additionally necessary to preserve the promotional chances for them, in the light of our recommendations that the requisite percentage of Class I Officers be inducted and maintained at all times in the Personnel Department.

4.3. We also recommend that, in keeping with our concept of the Personnel department having sufficient exposure to field conditions, the posts of Personnel and Welfare Inspectors should be declared as Selection Categories, and made an essential channel before promotion of Class III staff to the officer level in the Personnel branch. This will ensure that a proper transition is made between clerical book-keeping and file-pushing on the one hand, and active participation in the grievance machinery, field inspections and worker contact on the other. Furthermore, twenty percent of the posts of Welfare and Personnel Inspectors should be available to supervisors of all other departments (other than RPF and Medical).

4.4. In the scheme of things that we have given above, there is a clear emphasis on field experience. To this end we consider it necessary to point out that the Railway Board Secretariate Service should not be provided a channel into higher Personnel branch posts without stipulating adequate experience in an executive capacity in the zonal railways. A minimum tenure of three years in a Division or Workshop is suggested for this purpose.

#### 5.0. Internal-Structure.

5.1. The internal structure of the Personnel Department also requires some important changes to give more purposeful support to the individual branches. We are of the view that the decision making in 'establishment' matters, as against general issues of policy, industrial relations, welfare, etc. are best kept in the hands of those that exercise direct control over working levels. They should, therefore, be managed by the individual departments which are responsible to get work done, but they require close support for this purpose. The specimen charts at Annexure A.7.1 and A.7.2. incorporate a reorganisation whereby each Branch Officer at the Divisional level, and Head of Department in the Zonal Headquarters would have a Personnel Officer to assist him in these matters.

5.2. The role of the Personnel Officers in the executive departments (referred to as departmental personnel officers to distinguish them from those working directly in the Personnel Branch) will be on the one hand, to execute the orders of the Departmental Officer in-charge, and on the other, to advise and guide him, so that the Branch official can exercise proper discretion in grievance redressal and general policy matters. This would greatly ease the problem being faced today of Branch Officers being forced to devote a large percentage of their time to staff matters, and still not achieving very much, since each case has to be referred to a separate personnel department for securing orders. This revised arrangement is a major feature for better grievance redressal.

5.3. We recommend that all aspects dealing with transfers, promotions, rewards & punishments, nomination for training, career planning, service records performance evaluation etc. be dealt with by these departmentalised units. The departmental personnel officers would, of course, continue to maintain a link with the Personnel Branch to seek policy clarifications whenever required, and be responsible for orders that may clash with higher corporate thinking.

5.4. In the Headquarters Office, the Chief Personnel and Industrial Relations Officer should be provided with five distinct wings-one each dealing with Industrial Relations, Manpower Planning-Recruitment-Training Welfare, as well as routine Establishment Wings separately for officers and staff. The Industrial Relations Wing is recommended to have one portion for Personnel Research, as distinct from routine aspects of labour negotiations and Consultative Machinery. This Wing is extremely important, in our view, to establish a proper data base and evaluate the general changes emerging in the labour environment, both inside and outside the Railways, to anticipate the industrial relations situation of the future. They should also carry out a regular audit of personnel systems and office procedures with a view to improving office performance and cutting down handling time. We have shown a coordinating link between the Chief Planning Officer and the manpower resource wing of the Personnel Department in the Headquarters' Office. This is in recognition of the need for future plans serving as the reference point for manpower requirements.

5.5. A clear distinction should be drawn between welfare, and grievance redressal arising out of service matters. The specimen organisation charts provide for Welfare Inspectors to deal with matters of staff welfare, and serving directly under the Personnel Branch, while Personnel Inspectors have been recommended to be



under the Departmental Personnel Officers. The Inspectors dealing with grievances arising out of service matters, such as seniority, promotion etc., should be designated as Personnel Inspectors and have jurisdiction along departmental lines.

5.6. The organisation would have to be suitably strengthened in order that the Personnel Inspectors are not over-burdened and are able to visit work spots with reasonable frequency. We do not recommend any yardstick however, and the Railways may determine the requirements based on convenience and merit. For example, in the case of Gangmen, one Personnel Inspector should not be required to deal with more than about 500 staff while in a concentrated work spot like a Diesel or Electric Locomotive Shed, one Inspector may suffice for the complete unit, even with a thousand or more employees.

5.7. The other category, that of Welfare Inspectors, should not deal with matters arising out of service conditions, but devote their energies to genuine welfare activities, such as housing, education, colony conveniences, loans and advances, cultural activities group excursions etc. These Inspectors, therefore, should be provided not along departmental lines, but according to geographical locations. It is possible that a detailed study would reveal that the number of Welfare and Personnel Inspectors required is far more than the present sanctioned strength. The Railways should not be unduly concerned by an expansion of these categories, or see this in isolation. We anticipate that with the reorganisation of the Personnel Department, considerable redundancies in the clerical cadres would be thrown up, and their work would be supervised better. Even if some additional posts are necessary, they should be considered essential to tune up the administration and not be subject to scrutiny on financial considerations alone.

#### 6.0. Role of the Personnel Department.

6.1. In Chapters II, III & IV we have dealt with the role of the Personnel Department in matters relating to Manpower Planning, Recruitment, Induction and training. The organisation proposed by us provides for these needs by carving out separate cells for them, and with this we expect that the haphazard and ad hoc approach, so noticeable today, would give place to a more planned and effective management. At the same time, on day-to-day matters, the role of the Personnel branch is to give active support to the executive branches on staff matters, instead of merely acting as a lateral clearing house. This should become effective by placement of departmental Personnel Officers under the Branch Officers and Heads of Departments. This arrangement is recommended by us as a pre-requisite for an effective grievance redressal machinery.

6.2. A wing has been recommended\* for personnel research under the officer in charge of Industrial Relations in the Zonal Headquarters. This should enable the Personnel Branch to develop future strategies for 'creative bargaining, instead of mere tactical shadow boxing which has been the hallmark of traditional collective bargaining, to the detriment of healthy labour relations. We may add that bringing demands to a negotiating table should not be only from the side of labour. The management too, should sometimes present its problems. This is particularly relevant when changes are required

which may fundamentally effect the individual workers, such as issues arising out of updating of technologies, alterations in incentive schemes, development of new cadres, or wholesale reframing of promotion policies. Without adequate research, it may not be easy to find fair and purposeful solutions. We also see this wing as an instrument of Systems Studies, and improvement of procedures for which no machinery exists today.

6.3. We have referred in paragraph 1.3 to development of systems for maintenance of efficient personal histories, analysis of confidential reports and counselling. Under the present arrangements of a centralised Personnel Department, we have noticed a lack of adequate involvement, and the system is unable to consider the needs of the work as an individual. Far too much reliance is placed on annual classification of 'good', 'very good' or 'average' and no machinery has been built up for continuous review and feedback. Executive action has also to be frequently exercised in a vacuum in the absence of up-to-date information. Service records are sketchy, invariably behind schedule, and provide a poor data basis for day-to-day management.

6.4. Many officers have found themselves in a quandary when, in spite of the sustained non-performance of an individual, they are unable to support contemplated action for lack of records of previous warnings and adverse comments. Similarly, in a system of mass awards, virtually on a quota basis during Railway Week, Independence Day etc., it is not always possible to lean sustained high performance of an individual in such a large organisation, and there is valid criticism that recognition of merit has much to do with personal contact and subjective considerations.

6.5. Many of these aspects have been examined by us in later Chapters dealing with performance appraisal, motivation and morale. Whatever recommendations are made in this connection will depend upon the creation of an active evaluation machinery which keeps the performance and service history of an individual worker under constant review. This is a major role that we envisage for the departmental personnel officers.

6.6. It is hoped that by having them function with in the individual Branches, lists of seniority, confirmation, priorities for transfer requests, changes of trade etc. would also be up-to-date and accurate, and would enable Branch Officers to take action without delay. Similarly, it should be the business of these Personnel Officers to call out from the inspection notes or other specific documents comments made about individual performance which cannot invariably be put in detail on record in the confidential dossiers, but may provide a guide for annual appraisal.

6.7. We would go a step further, and give the departmental personnel officers an active role in determining performance of individual sections and work spots. It frequently happens that a sharp decline in the quality of work from a certain area is unrelated to material inputs, and is a result of a sudden shift in inter-personal relationships. In a vast system of highly standardised work, this may well prove to be an important factor in variations in performance. It should be the responsibility of the departmental Personnel Officers and Personnel Inspectors to keep their ears close to the ground, regularly visit field formations, and talk to staff and



supervisors, so as to advise the Branch Officers regarding any disharmony that may have developed in group working.

6.8. We shall be dealing later with Performance Appraisal, as a tool for improvement, and not merely as an instrument of punishment and rewards. This implies that the annual appraisals have to be scrutinised for individual traits, aberrations, and marked shifts from previous reports. This practice is absent at present, since no person in the organisation has the responsibility for time-trend analysis of individual personality traits or performance, and no real attempt is made to counsel, guide or moderate. We recommend that this be a specific charge of the Personnel Branch, and the provision of departmental Personnel Officers to assist the Branch Officers on the divisions, and the Heads of Departments in the Headquarters should be utilised to perform these functions. Emerging from such analysis and discussions with the Reporting and Reviewing officers, the reportee may be assessed more fully, as an individual capable of achieving a higher degree of his or her potential; whether by counselling on individual character traits, or specific training, or even an altered placement.

6.9. In the final analysis what is required from Personnel Management is the creation of a sense of well-being in the work force. This can be stated, more appositely, as the role of the Personnel Branch in a capsule, and which seeks to shift the emphasis of personnel care from material benefits to the psychological motivations of the work force, their aspirations, and their harmony with work the environment. Individual welfare measures are undoubtedly important but miss the larger issue. No single act or input can achieve this. The attitude and role of Management as a whole, in which the Personnel Department has to play a pre-eminent part, needs considerable change.

6.10. Recognition of the importance of the human resource base, a proper selection and training of Personnel Officers a longer-term involvement of such officers with Personnel Management, and their continued participation in the wider objectives of the Railways are the specific changes that we recommend. There appears to us to be a lack of glamour for Personnel affairs in the thinking of railway officers. This lies at the bottom of the disregard for sustained attention to the Personnel Department and its systems of work. It is only recognition by senior management that the human resource base is its most precious asset, that can change this outdated attitude and facilitate the future efficiency of the Railway's performance.

## 7.0. Conclusions.

7.1. Although the Railways were in many ways pioneers in personnel management in India and were amongst the first to set up separate Personnel Departments, there is a general lack of vigour and innovation in this important area now and the Railways have not kept abreast of contemporary developments in its management methods. To a large extent this is on

account of reluctance to spare competent officers from the various branches to serve as Personnel Officers, and the increasing domination of unexperienced and unqualified persons in the Branch. The formation of an Indian Railway Personnel Service is, therefore, to be welcomed.

7.2. There is a danger, however, that a separate specialised personnel service cadre may develop an inward looking stance and get isolated from the real conditions in the field. The training of IRPS probationers should be made more field oriented, and the syllabi accordingly revised. Furthermore, the bulk of IRPS recruits should be posted to one or two zonal Railways, whose performance may be compared with the other zones so that a comparative assessment is possible in due course.

7.3. At the non-gazetted level, personnel and welfare Inspectors should be increased with the simultaneous reduction in ministerial staff. The category of Inspectors should be filled entirely by selection and should form an essential channel for formation to Class II Officers in the Personnel Branch. Some of these posts should be open to Class III employees of all Departments. Simultaneously, there should be greater reliance on mechanisation of office procedure, rationalisation of personnel Systems, electronic data processing, with reduced spans of control. The department as a whole should be officer oriented.

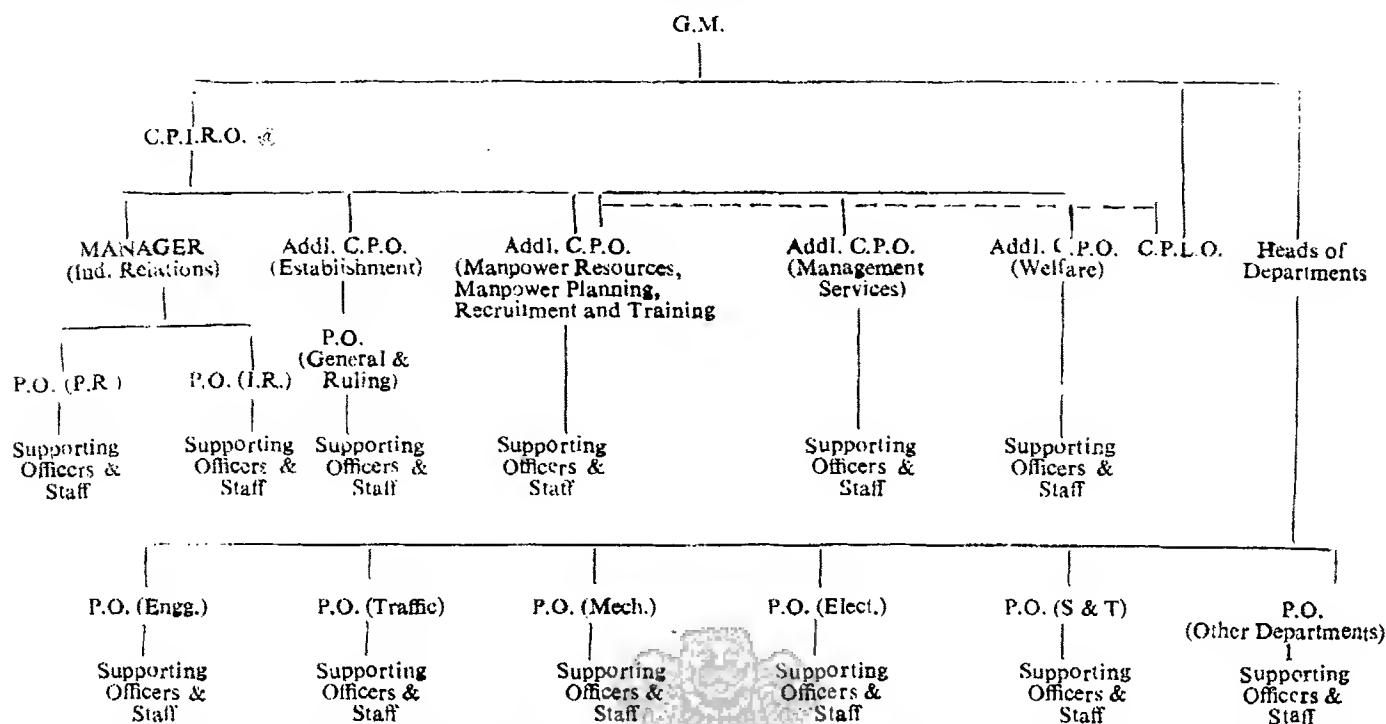
7.4. Whether there is to be a separate IRPS or not, and more so if it is to continue the Personnel Branch should be split into two chains of command. On the functions should be in the Personnel Department itself, while the other should serve under the various executive officers. All matters relating to service such as promotions, transfers, increments, training etc. should be brought under the executive officers who should have adequate Personnel support. This arrangement is applicable both at the Divisional and Zonal levels. The Personnel Department itself would then concentrate on policy formulation, industrial relations, improvement of methodology, welfare activities etc.

7.5. Reorganisation of the Personnel Department has been suggested to create Man-Power Resources wings at all the three levels, viz, Railway Board, Zonal Headquarters and Divisions to deal with man-power planning, recruitment and training as a unified subject for all departments. In the Zonal Headquarters, the Industrial Relations Wing should also have one Cell for Personnel Research. This is envisaged for evolving a proper data base for labour negotiations, and also as a specialist service, to review methodology, performance, and keep the Personnel Branch management System up-to-date.

7.6. The role of the Personnel Branch attached to various executive officers should be expanded to evaluation officers should be expanded to evaluation of annual performance appraisals, counselling, and giving the necessary specialised support for decision making by the executive officers.



### PERSONNEL DEPARTMENT STRUCTURE SPECIMEN ORGANISATIONAL CHART FOR ZONAL ORGANISATION



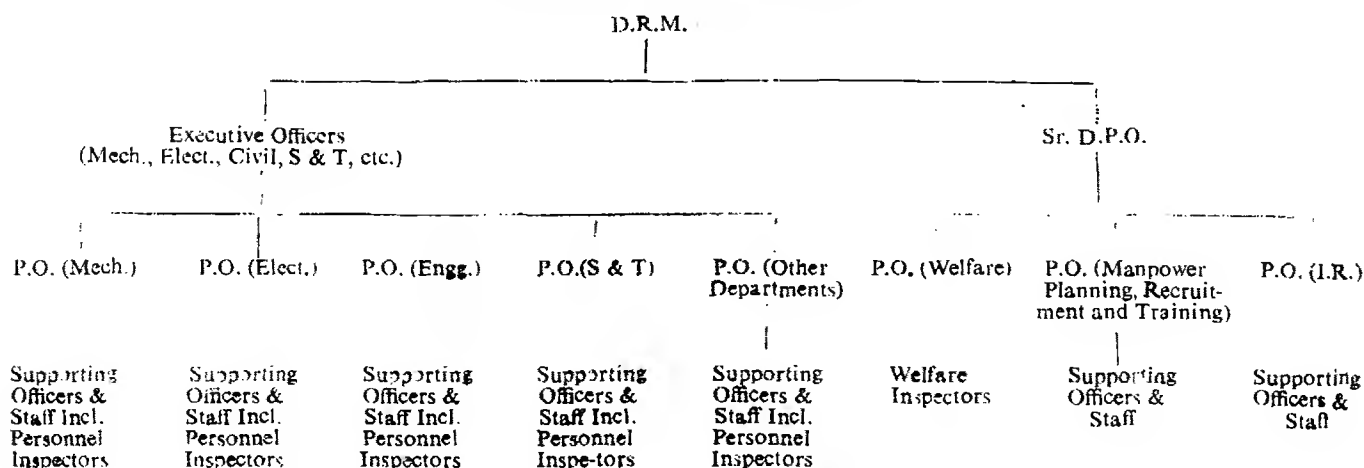
N.B.—Posts shown in boxes indicate a single Officer at the Apex. Others indicate the function and actual number of posts may be fixed according to work-load.

Key.—C.P.I.R.O. — Chief Personnel & Industrial Relations Officer.  
C.P.L.O. — Chief Planning Officer  
P.R. — Personnel Research  
I.R. — Industrial Relations

@ The Committee recommends that the designation, 'Chief Personnel Officer' should be changed to 'Chief Personnel and Industrial Relations Officer' to emphasize that Industrial relations are the responsibility of the Head of the Personnel Department.

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### PERSONNEL DEPARTMENT STRUCTURE SPECIMEN ORGANISATIONAL CHART FOR DIVISIONAL ORGANISATION



N.B.—Posts shown in boxes indicate a single Officer at the Apex. Others only indicate the function and actual number of posts may be fixed according to work-load.

Key.—D.R.M. — Divisional Railway Manager  
S.R., D.P.O. — Senior Divisional Personnel Officer  
I.R. — Industrial Relations.



## CHAPTER VIII

### PROMOTION POLICY AND CAREER PLANNING

#### 1.0. Introduction.

1.1. In Chapter II, we have suggested that manpower planning should be derived from a futurist model of the organisation looking ahead ten or fifteen years. This involves identification of advancing technologies and systems, and tying these anticipations with manpower requirements, educational levels for recruitment, and training needs. No organisation can, however, hope to fold its competent personnel and expect them to function continuously with enthusiasm and dedication, unless adequate avenues for their advancement are available. This is too important an aspect of morale and efficiency to be left vague and dependent on local whims. In the past thirty years Railway employees have, in a number of cases, stagnated for extended periods in various grades from time to time. Ad-hoc surgical action was resorted to in the form of upgradations when the position become unbearable. There is a great difference between pay rises through upgradation, and having a smooth career progression which would not only motivate a person but also facilitate reasonable tenures in positions of responsibility.

1.2. The Railways should, therefore, have a well-defined carrier plan for each broad category, and this should be taken into account in the determination of recruitment, structure, and the pace of development that is physically possible. In this, promotion policy is a vital factor.

#### 2.0. Career Planning for Non-gazetted staff.

2.1. We have made a number of recommendations in Chapter III, regarding the qualifications for recruitment at various levels. In general, our approach has been that the Railways should adjust their policies to induct, with advantage, the large literate and trained manpower that is pouring out of our educational and vocational institutions. Our recommendation entails a substantial change in the educational profile of the average employee. The resultant effect in the field of motivation and morale would, however, also have to be dealt with. As levels of education rise, the aspirations of people undergo changes and management of the work force is likely to throw up problems requiring departure from traditional personnel policies wherever they are found to be unsuitable.

2.2. Before going into promotion policy, we would like to touch upon the levels to which different categories of workers should reasonably expect to rise, as well as the phasing of promotions in broad terms. With improved recruitment standards there will be a narrowing gap between the basic educational qualifications of different levels, as well as some probability that in the course of service, some individuals joining in the lower rungs may be able to acquire sufficient qualifications to meet the highest academic criteria. Table 8.1 lays down a broad career plan for non-gazetted categories as a guideline. We shall deal with officers' separately in paragraph 3.

Table 8.1

**Career Plan for Non-gazetted staff.**

<i>Type of recruit</i>	<i>Approx. time frame of first promotion subject to suitability for promotion/trade test</i>	<i>Level to which a competent person should reasonably be in due course</i>
Class IV with High School Education and technical training in suitable cases.	About four years	Supervisor
Class III with XIIth Class education or Diploma holders Graduates in suitable cases.	About four years	Senior Scale Officer.

2.3. The conceptual plan given in Table 8.1 is directed towards the future railway employee who has been recruited in accordance with the educational qualifications we have prescribed. The plan would not, therefore, apply to a very large body of workers already in service, who were recruited in the past with poor educational backgrounds. Further more, the existing labour force in the Railways has been recruited largely on an ad hoc basis, without any real attempt to build a career plan in to overall manpower policies. We would, however, like to emphasise certain guiding principles for the future, for those recruited under the revised standards :

1. No person should normally remain an unskilled hand for more than 4-5 years. This also implies that certain categories of staff, such as peons, messengers, sweepers etc. for whom it is not easy to find promotional channels, should be increasingly reduced by mechanisation and better and more modern office systems.
2. In a career plan of 30-35 years, a person joining at the bottom of the rung, should be able to get five to six promotions on seniority-fitness criteria and rise up to the level of a supervisor, as per the promotion policy laid down later in paragraph 4. For a person joining in Class III, the number of promotions may be somewhat less, but in all cases, the tenure at the highest level should be planned for at least five years. This is necessary to ensure that the highest point in the grade is reached for full retirement benefits, and a good return to the system.
3. We recommend the adoption of a system of Advanced Operators for artisan staff. Owing to a time frame for promotions every 5 to 6 years, a person who is a Highly Skilled Machanic and masters operation of a sophisticated and complex machine would ordinarily change over to supervisory duties in a short while, and a posting elsewhere on promotion. The whole process of training a new man and allowing him to build up sufficient expertise



has to be repeated. This produces a situation which would result in some loss of efficiency to the organisation. In accordance with the practice in many advanced countries, means should be found to retain a man as an operator while still giving him due pay increases. In the Railways the existing system is inflexible, and once a worker's pay rises to a certain level he is declared a supervisor and used as such. The negative aspects of this system were brought home to us in our various visits, and, especially at the Diesel Locomotive Works, Varanasi. We recommend that the Railways should have no hesitation in using persons as operators on intricate or difficult jobs even if, by qualifications and experience, they could fit into supervisory categories elsewhere. A person on promotion should, therefore, be used as a supervisor or as an "Advanced Operator" according to the needs of the system. This should be allowed in the production units, and elsewhere in exceptional cases.

4. The concept of a hierarchy dependent on pay scales will have to lose its rigidity. Unless this is done, it may not be possible to achieve the desirable career advancement pace, without serious distortion to organisational structure. For example, in a workshop or shed, a Senior Chargeman might be supervising the work of two or more gangs, each under the charge of a Junior Chargeman. One of the Junior Chargeman may on upgradation of his post, be promoted at the same place as a Senior Chargeman without altering the line of command. Thus it might, at times, become necessary for a person to report to another in the same scale of pay. It should be ensured, however, that a senior man is not asked to report to a person junior to him.
5. An accelerated channel of promotion should be provided for really out-standing persons that should enable them to rise both Quicker and to a higher ultimate level than their colleagues. Paragraph 4 later discusses how this might be done.
- 2.4. An arithmetic of work distribution arises out of the career progression suggested above. This entails substantial variation from the current practices. Some of these implications are spelt out below in broad terms :

1. Allowing for attrition, based on factors other than superannuation, it appears that not more than about 20 per cent of the total non-gazetted posts should be held in Class IV or 'unskilled' categories. This is in sharp contrast with the present practice of such posts accounting for more than 50\* per cent of the total. This is a pointer to the poor state of technology and over-reliance on traditional administrative practices. All over the world it has been the experience, that, with greater mechanisation, advancement in handling techniques, and more sophisticated management control systems, the need for unskilled men comes down sharply as a proportion of the total

labour force. Even in our Railways this is manifest, to some degree, in diesel and electric traction. No forward looking career plan can be made effective with such a wide base to the promotion pyramid. The recent recommendation of the RWCT† that 60 per cent of Class IV posts in the Workshops and 50 per cent in the open line, be upgraded, would bring the percentage to below 30. We do not endorse this recommendation of RWCT of bringing down the percentage of unskilled hands only by a simple upgradation without changing the content of work. What we have in mind is that unskilled work should gradually yield to more and more sophistication and therefore higher demands on the skill and experience of railway workers. We, therefore, recommend that these posts should increasingly be used for direct work, as modernisation plans are implemented and workload expands, and thus there should be continuous reduction in unskilled categories.

2. In order that a Class IV entrant can aspire to reach a level of a junior supervisor in about 25 years of service, the ratio of supervisory posts *vis-a-vis* the rest of work force, will have to be altered by reducing the spans of control‡. The supervisor to staff ratio should be kept at about 1:5. This does not mean, necessarily, that this ratio should be fixed for each work Group, but only as a guideline for the overall mix. There would be a large number of areas such as Planning, Inspection, Statistics, Data Processing, Purchase, etc., which will have to be manned by the supervisors without much staff under them. In such cases, the ratio of supervisor to staff would naturally be very high, whereas at field levels, the number of workers reporting to a supervisor may be 7 or 8. The average ratio for the system, however, would be around 1:5.
3. The percentage of posts in various grades of Class III have been fixed to give reasonable promotion opportunities. In practice large distortions take place, owing to the pattern of increasing workload, which is not uniform over the system. A regular practice of 5-yearly cadre review for class III staff should, therefore, be adopted in much the same manner as was recommended for officers by the Third Pay Commission.

### 3.0 Career Plan for Officers.—

3.1. Indian Railways are the largest public sector undertaking employing over fifteen lakh employees. For manning such a gigantic undertaking, there are only about 2,000 directly recruited Class I Officers.

3.2. It is also a fact that, of late, the Railways like other central services, have not been able to attract the best talent available in the country, because of the private sector offering more lucrative pay scales, perquisites, and better promotion prospects. There is also a disparity in the promotion prospects of Railway officers as compared to those belonging to Indian Administration.

\* The present ratio is 54 per cent on the Zonal Railways, and 28 per cent in the Production Units.

† Railway Workers Classification Tribunal.

‡ Cf. Para 9.4 of Part V.

@ In addition more than two lakh casual labour are employed on the Railways.

§ This excludes the medical department.



tive Service/Indian Foreign Service. Quite a number of railway probationers are thus tempted to take the competitive tests again and many leave the railway job to join other services, specially now that the upper age of entry has been increased to 28 years. The expense and the effort spent for training such officers is lost to the Railways. This phenomenon of exodus is not limited only to the probationers. Some Railway Officers are on the look out for jobs with better career prospects and leave the organisation after putting in several years of service. Between the three years 1980-1982, seventy officers resigned after putting in more than fifteen years of service.

3.3. A long-term career planning culture seems to be missing on the Railway, and it is only when stagnations occur and pressures develop, that cadre review proposals are taken up for consideration. The Third Pay Commission had recommended cadre reviews at regular intervals every three years. Railways, however, have not followed this time table. After the cadre review of 1973, the next review was conducted only in 1980. And since then heavy stagnations had built up again. We recommend that cadre reviews should regularly be conducted every three years in accordance with the Government's decision.

3.4. Prior to the last cadre review which took place in 1980, the hierarchical management structure was such that a Reporting Officer was always in a grade higher than the officer who was being reported upon. There was never an instance in the history of the Railways where an officer wrote the confidential report of another officer in the same grade. The last cadre review which took place in 1980 somewhat distorted this organisational structure. The co-ordinating head of the department in a zone, not necessarily the seniormost, has been given the position to write the confidential reports of the other Heads of the Departments in the same grade of pay. The Committee are told that this is causing considerable resentment amongst the senior officers. This anomaly, we feel, should be urgently rectified, restoring the hierarchy so as to have a genuine head in each discipline on the zones.

#### 4.0. Recruitment planning.

4.1. One of the main shortcomings is that the structure of the gazetted cadre on the Indian Railways does not provide for a planned service career and the position has been aggravated by erratic and unplanned recruitment in the entry grades. The cadre management on the Railways is still suffering because of a comparatively higher intake of officers made in 1957 and 1958\*. For example, in the Civil Engineering, Mechanical and Traffic cadres, 40 to 50 candidates were inducted in each, of these years which was about three times as high a rate as in the previous years and more than twice the rate for the subsequent years.

4.2. This resulted in further stagnation in an already poorly planned cadre. The Study Team for the Railways under the Administrative Reforms Committee reported in November, 1968† that at 16 years of service, an average Railway officer was earning nearly 40 percent less than his counterpart in the Indian Defence Accounts Service, and the position remained unchanged for the rest of his career. The report also brought out somewhat lesser, but nonetheless significant differences

existed between the Railways and every other Central Service. Only 12.2 percent of the officers' posts were in the Junior Administrative Grade and above, as compared to thirty to forty percent in the other Services. In the absence of any longer term career planning, the Railways were forced to make upgradations in 1969, 1973 and 1980, but the comparative promotion prospects of Railway officers continue to be behind the other Services.

4.3. A reduced level of recruitment after 1959 may have eased the situation a decade or so hence, but in the past three years, recruitment levels have increased so dramatically, that the Railways may find it difficult to cope with the resultant situation unless well-defined norms are laid down. Table 8.2 gives an idea of the erratic nature of recruitment to the various Class I Services of the Railways since 1959.

See Annexure A.8.1 for details

Table 8.2

#### Annual Recruitment of Class I Officers

Name of Service	Ave rage 1959- 1963	Ave- rage 1964- 1968	Ave- rag 1969- 1973	Ave- ragee 1974- 1978	1979	1980	1981
Indian Railway Service of Engineers.	24	12	11.6	18	34	50	75
Indian Railway Service of Mechanical Engineers.	11	11.6	19	26.8	26	6	54
Indian Railway Service of Electrical Engineers.	9	6.4	7	15	13	55	55
Indian Railway Service of Signal Engineers.	8	6	4	8	15	50	50
Indian Railway Stores Service.	6	5.6	4.2	9	9	21	25
Indian Railway Traffic Service.	29	15	19	21.6	18	48	60
Indian Railway Accounts Service.	12	7	9.6	13.6	14	25	25
Total	99	63.6	74.4	112.0	129	285	344§

§ Another 25 persons taken for IRPS also.

4.4 It appears that the mistakes made in 1957 and 1958† are being repeated which are indicative of lack of planning, and no thought being given to the planning of officers careers. We are informed that the indents for 1982 are even higher than those of 1981. For 1982, the Signal and Telecommunication branch placed a demand for 137, which has been mercifully cut down by the Railway Board, through a directive that in no single year would any Branch be allowed to recruit more than 75.

4.5 About 350 Class I Officers are currently being recruited into the Railways annually, and for them less than 50 posts higher than Head of Department rank

\* This corresponds to entrance examinations held in 1955 and 1956

† These corresponds to entrance examinations in 1955 and 1956



would be available if the cadre remains the same as at present. Judging by past experience, it is not always easy to expand the cadre at the higher levels in accordance with the widening base of recruitment. In the situation in which the Railways are placed today, many otherwise competent officers are not even able to rise to positions of authority\*. Further, the tenure at higher levels has tended to become shorter and shorter, which results in unsatisfactory policy planning and long-term perspective. With a disproportionate base of recruitment, this situation is unavoidable, no matter how strict are the selection criteria.

4.6 We understand that with the setting up of RITES IRCON, COFMOW and management contracts abroad, a shortage of Class I officers is being felt at the middle level and the preponderance of promotees in the officer ranks, is posing many problems. Yet, by suddenly increasing recruitment by 400 to 500 percent as compared to the levels the period prior to 1979 the Railway Board has displayed a lack of fore thought that we cannot, but, comment upon. An increased requirement of officers should have been apparent to the Railways in the early Seventies and recruitment suitably phased.

4.7 The Committee have estimated† that taking into account normal attrition in the Railways, recruitment in excess of 3.4 percent of the total directly recruited Class I cadre (including persons on deputation) leads to deterioration of promotion prospects. Even to cater for expansions the additional posts would have to be phased out.

#### 5.0 Promotion prospects.

5.1 The table below gives the existing promotional prospects of railway officers as on 1-1-1983.—(This does not take into account the higher recruitment levels of the past three years.)

Table 8.3

#### Promotional Prospects of Railway Officers

Category	Year of service at which presently being achieved
Junior to Senior Scale	4-5th year
Senior Scale to Junior Administrative Grade	8-9th year
JA Grade to Selection Grade*	22 nd year
Level II, Head of Department	23 rd year
Level I, Head of Department (Super-time scale)	26th year
AGMs, CAOs, GMs etc.	33rd year

5.2 From the above statement, it is clear that while the promotion prospects upto Junior Administrative Grade are satisfactory, above the Junior Administrative Grade the prospects of promotion are poor, talking only in terms of the time span for promotions and management development. Although, comparison with other Government Departments cannot be used to suggest a

parallel promotional structure in each matter of detail, it is relevant to mention that there is a difference of about 9 years between the time a Railway Officer gets the Selection Grade and his counter-part in the Indian Administrative Service. This gap broadly continues for all higher grades.

5.3 We have already indicated that in accordance with the recommendation of the Third Pay Commission, which was accepted by the Government, cadre reviews have to be conducted every three years. The last cadre review having been conducted in 1980 the next cadre review is now due. We are anxious that this reviews would not be conducted in a routine manner, but the matter should be studied in detail by a sufficiently senior officer specially earmarked full time for this job. The officer should make detailed proposals taking into account the structural requirements of the Railways and all relevant factors. In this connection, it is also necessary to discuss deputations of Railway officers to other organisations.

5.4 We have found that Railway Officers do not get adequate exposure to other organisations which would enable them not only to contribute their expertise in a large number of fields, but on return to the Railways bring a wider appreciation of policy and problems.

5.5 Railways have a great deal of expertise in Engineering, Accounting, Commercial and Transportation fields. One of the Chief Secretaries suggested in his discussion with us, that the Railways should take a more active interest in supporting Road Transport Corporations by providing both technical and accounts managers, as the State Governments have very limited expertise available to them in these fields. The same holds good for a large number of organisations in the public and cooperative sectors. We are informed that the Railway Board have been showing reluctance in releasing officers on deputation on the ground that they find it difficult to release competent persons in any great numbers. This is a short sighted policy, and in any case not desirable in the light of a very heavy stagnation in promotional prospects. We, therefore, recommend that the Railway Board should encourage deputations to public sector undertakings and Central Ministries as policy and we are confident, will pay dividends in the form of management development, innovation, better cooperation with other departments and in general make the railways more sensitive to the users and common travelling public.

#### 6.0 Promotion Policy for non-Gazetted staff.

6.1 As far as the Class IV staff and artisans categories are concerned, promotions are at present strictly according to seniority subject to the rejection of the unfit, and subject to the passing of trade tests or competency tests wherever prescribed. We do not recommend any change in this system as this has worked fairly well in the past. However, trade test manuals do not appear to have been revised with sufficient frequency, and, even when updated, are generally not followed. For example with increasing sophistication in instrumentation, it is important that a skilled fitter be competent to measure items like run-out, surface finish, and to use dial indicators, instead of the traditional simple measurements, only with micrometres and vernier calipers. The implementation of this in the field needs to be watched carefully all the time.

\* Co-ordinating Heads of Department on the Zonal Railways.

† Cf. Annexure A-8.3.

‡ There are hardly 90 such posts, and all officers do not go through this channel.



6.2 The promotion of Class III, non-artisan staff to higher grades within the group, is either on the basis of seniority-cum-suitability (Non-selection posts) or in accordance with merit judged through written test and interviews by a committee of officers, due weight being given to seniority (Selection posts). There are detailed instructions regarding the grades to which promotion is to be made by the former and latter methods. The field of selection is also laid down. Generally, selection and non-selection grades alternate. For selection posts, the senior most persons constituting three times the number of anticipated vacancies in the following two years are considered; there is also a provision for awarding marks under various heads, such as service record, seniority, personality and leadership and professional ability as assessed by the test conducted as part of the selection). Again, those who obtain eighty per cent or more in such marking are treated as 'outstanding' and ranked above others in the select panel, subject to certain limits.

6.3 Theoretically, the process seems to be satisfactory enough, but in actual practice, we find that it has neither generated confidence among the employees, nor has it been found satisfactory in throwing up really competent persons. For instance, the criteria 'for outstanding' includes marks for seniority, (to the extent of twenty percent) making it virtually impossible for any but the top two or three in the seniority list being declared so in the grading, and in their case this is of no consequence.

6.4 There are also serious delays in the selection process. We are informed of fuel and store issuers of the Delhi Division of the Northern Railway continuing ad hoc since 1975 without final selections for these posts, and if the selection is now done it would not be fair to the incumbents who have held the posts so long. We have found an even worse situation in the Electrical department of the same Division\*.

6.5 The defects seem to be in the detailed implementation of any individual selection.

#### 6.6. The problems that arise are;

1. Determination of the number of vacancies and thus the number to be considered this is a source of conflict; if it is too small the juniors left out have a grievance; if it is too large the seniors suspect malafides.
2. Arising out of disputes about the zone of consideration, there is scope for securing injunctions thus putting off the entire process of selection.
3. Even during the later stages of selection, disputes about seniority and the conduct of the selection are raised, resulting in representations to higher authorities and even writ petitions.
4. Selections thus get considerably delayed and ad-hoc promotions given to the senior most persons last a long time. The fixation of status and resolving of disputes sometimes takes years and often temporary ad-hoc promotees are per force regularised.
5. The selections do not really provide a wide field of choice. Every year a large proportion of the persons under consideration are those who have failed to make the grade earlier, and the field of selection is, therefore, considerably reduced.

6.7 The present process has not served the objective of promotion of the really meritorious. On the other hand, the unions consider that promotions should be strictly by seniority.

6.8 To give more weightage to merit and to get over the defects in the system delineated in paragraph 6.6 above, we recommend the abolition of the existing method of promotion within the Class III category. Instead, 75 per cent of the vacancies at each promotion should be filled in on the basis of seniority-cum-suitability and the remaining 25 per cent on merit, and should be open to all persons in the eligible grade. The inter-se seniority of the persons promoted on the basis of seniority-cum-suitability and on the criterion of merit should be determined, however, on the basis of their original seniority in the lower grade. A similar system already exists in the case of promotion of Class III employees to Class II. Also the proposed competition test for the percent quota should be through a written examination to gether with an assessment of records by a Committee of three officers, followed by an interview.

6.9 We feel that apart from simplifying the present method, this will also reduce disputes presently clogging the courts and lead to all round satisfaction, at the same time providing for an adequate number of really meritorious people to move upwards faster than at present. We have elsewhere recommended the intensification of in-service training and promotional courses, and this should further ensure that even the personnel in the seniority quota will be better equipped than at present.

6.10 We learn that there is much suspicion in the minds of staff regarding selection process on account of the fact that this is normally conducted by officers under whom many of the candidates directly serve. Pre-conceived notions, therefore, frequently come into play.

6.11 Our recommendation to dispense with selections for 75 percent of the vacancies would largely eliminate the problem, but some problem of credibility may still remain for the balance 25 percent of the vacancies to be filled in by an accelerated channel. We believe this has, indeed happened in the case of the 25 per cent quota for promotion to Class II from amongst the supervisory staff.

6.12 To bring greater credibility to the process of selection we recommend that for the written examination roll numbers are provided by the confidential cell dealing with selections, and no names given on the answer sheets. Since the performance appraisals of the candidates will adequately establish the candidates ability to manage at actual work, it would provide even greater credibility to the selection process if the selection committees consist of officers under whom candidates are not currently working. This may not be possible in all cases, but it should be adopted as a general guideline.

#### 7.0 Promotion Policy in the Gazetted Cadres.

7.1 The Railway Board have stated that the promotion policy in gazetted cadres of railway service is as follows:

1. From junior scale to senior scale on the basis of seniority, subject to the rejection of the unfit.

\* These were studied as random samples.

† Cf. paragraph 6.6.



2. From senior scale to Junior Administrative grade and higher grades-on the basis of merit, within the zone of consideration.

We, however, learn that the weightage made to merit is only at the time of drawing up panels for the Level II Heads of Departments, for which a person who has 4 outstanding reports in the past 5 years can be given seniority over three persons just above him. Even this has certain riders. Only posts of General Managers are filled up through a pure selection process, but even here, the zone of eligibility is so narrow as to prevent younger persons from achieving these positions and having reasonable tenures.

7.2 While the promotion policy enunciated above is unexceptional, the Committee learn that, in actual fact, the consideration given to merit is secondary and promotions are largely based on seniority. In fact, therefore, the system is one of weeding out those that are clearly unfit, and promoting others in order of seniority, without distinguishing between grades of competence.

7.3 An example of such promotion is the manner in which posts of Additional General Managers, created recently on the Zonal Railways, have been filled. The posts were created with the object of improving promotional chances in higher grades and for reducing the unwieldy span of control of General Managers. In actual practice, officers on the verge of retirement have been passing through this channel and in order of seniority.

7.4 The issues arising out of the promotion policy for gazetted officers in higher ranks are made complex by the need to have persons with exceptional ability in the posts of Divisional Railway Managers, Chief Administrative Officers, General Managers, Board Members etc. The criteria for selecting persons from the various disciplines of the Railways for such posts would be at some variance with promotions within the regular cadres, as also the implications of experience in certain fields. The subject cannot be assessed in isolation from the larger issue of management structure and, therefore, we shall deal with this part of the subject in the report on 'Organisation'.

7.5 The analysis of the officer cadre made in paragraph 5 highlights the difficulty in meeting the reasonable aspirations of officers within a desirable time frame. At various places during our visits we have been given figures of officers heading important organisations and institutions being changed over every few months. A greater emphasis on well considered selections for such appointments is, therefore, necessary.

7.6 We recommend that the existing system of giving overwhelming weightage to seniority should be dispensed with, and that appropriate weightage be accorded to merit at all promotional levels so that really competent and suitable officers are selected for holding top management posts. This would become administratively easier once the Railways switch over from the existing system of Classification of officers to the numerical system proposed in paragraph 8.6 more or less as is now being done in the case of Armed Forces officers.

## 8.0 Performance Appraisal.

8.1 Despite examination by the First Pay Commission (1946-47), Second Pay Commission (1957-59), the Administrative Reforms Commission (1967) and further views by inter-ministerial groups and others,

considerable dissatisfaction continues to prevail on the present system of performance appraisal.

8.2 We have gone into this question and are of the view that,—

1. the basic objective of the system is not clearly defined;
2. appraisals are susceptible to considerable subjectivity;
3. the formats do not lend themselves to evaluation of potential and are, therefore, inappropriate for being used as the basis for planning of human resources; and
4. machinery does not exist to follow up reporting in a constructive manner.

8.3 One of the greatest lacunae in the present system of appraisal is total lack of follow-up action and inability to either use the appraisal as an instrument for development, or to sift out subjective factors. To this end, we recommend that it be made obligatory for performance appraisals of each person to be discussed between the reviewing officer and a representative of the Personnel Branch. We have already suggested that there should be Branch Personnel Officers reporting to the executive officers. They should do the spade work in checking the appraisal against past records, and point out any sudden shifts. Wherever any report is out of character with past performance, this would suggest counselling to the employee or to the reporting officer or, perhaps, an in-depth analysis of the work environment. In the case of officers, the report should be discussed by the Head of the Department with the Chief Personnel Officer.

8.4 The formats themselves need some change. The objective of the annual appraisal should be clearly understood, in as much as it is primarily a basis for human resource development in the organisation, and not merely a document to determine individual selection for promotion. To this end, it should highlight both strengths and weaknesses of the appraisee without this necessarily determining the final grading.

8.5 To make the appraisal performance-oriented, while separate formats will have to be devised for different categories of staff, certain additional features common to all categories should be introduced. These are:

1. Does the person take interest in the long-term objectives of his organisation or is he largely concerned with routine work,
2. A column should be provided, "Development of subordinates". This is necessary to evaluate the organisation building approach of the appraisee. Particularly to be noted is whether he takes interest in training aspects, insures that his staff are released for various courses, and generally interacts with the training institutions.
3. For what type of work is the person best suited, viz. management, planning, R&D, technical control, teaching etc. Needless to say, comments of this type are intended only to highlight areas of strength and would have no connection with the final grading



4. A separate out-away portion of the Confidential Report should carry remarks about any specific training course for which the appraisee is recommended. This could, then be dealt with separately.

8.6. Comments on the areas of strength and weakness of an employee should not ordinarily be related to the final promotional grading. For example, a comment that a person is good for planning work, should not be construed as a comment on his technical ability and vitiate against his being considered fit for promotion. Similarly, a person very good at one type of work, but not sufficiently involved with formal planning may also be fit for promotion but this only helps in framing his postings, counselling etc.

8.7. We have already stated that a record of five years be considered during selection. This should be made longer to cover the assessment of at least two reporting officers, as also in doubtful cases where there is difference in the assessments made by the reporting officers. This, to our mind, is the best way to lessen the impact of subjectivity, especially, with the controlling officers frequently sitting on the selection committees of staff whose performance appraisals they themselves have written. While this would go some way in mitigating the subjectivity factor, some changes should also be made in the methodology of appraisal.

8.8. We consider that there are certain advantages in following a numerical grading as has been adopted in the Defence Services. While a 9 point scale may be followed for junior Officers, only 5 of these (9,7,5,3 and 1) may be utilised for Officers above Selection grade. The overall grading should be related to the total numerical score obtained by adding up the marks for each attribute. Railway Board should lay down norms for utilisation of the numerical grades during selection.

8.9. Self appraisal had been recommended earlier by the Administrative Reforms Commission, but in the Railways, this system was adopted only for officers of the Railway Board Secretariat Service. While we do not favour self appraisal in general, we feel that there is a case to introduce this concept for officers involved in R & D, since it is some times difficult to evaluate their performance over what, to them, is a short span of time.

8.10. The question of whether a report should continue to be 'confidential, or an 'open' system adopted, has been debated from time to time. We feel no cast iron conclusion is possible. There will always be some people on whom the open system will have a salutary effect, while, for others, it may lead to frustration. On the whole, revealing to the appraisee what is written might affect the objectivity of appraisal. The role of the Personnel Branch in follow-up and counselling would go a long way in accommodating both sides of the picture without actual disclosure of the details of the appraisal. Whenever an adverse remark is made, however, it must invariably be communicated to the employee. We have learnt that it has often happened that an Officer to whom no adverse comments have been communicated, is denied promotion on the ground that he is not fit. This can only happen if either the final grading has not been link with individual attributes or such attributes had not been communicated.

#### 9.0. Promotion and the Reservation Policy.

9.1. We have been struck in our meetings with various railway officers and staff bodies, by the extent

to which promotional quotas for reserved groups has evoked resentment and protest, arising out of some unusual procedures followed by the Railways. Time and again this has been quoted as the single biggest cause for low morale, lack of motivation, and a pervasive sense of frustration especially among staff in Class III. We find that as far back as 1968 the Wanchoo Railway Accident Enquiry Committee had observed. "In the course of evidence tendered before us, it was pointed out that among the factors responsible for the discontent among the supervisors, one was the present procedure of reservation of posts for Scheduled Castes and Scheduled Tribes. Such reservation, we were told, adversely affects the enthusiasm, incentive for hard work and devotion to duty, and in turn the efficiency and morale of supervisory staff".

9.2. Later the Sikri Railway Accidents Enquiry Committee, 1978, stated that the special provisions for promotions of Scheduled Castes and Scheduled Tribes "do not appear to consider the effect of such promotions on the persons who have been superseded and feel frustrated and disheartened. The 'depth and extent of frustration and its ill-effects and safety on railway working should be studied further'".

9.3. Considering that in its broad applicability the reservation system is a national policy, the discontent in the Railways can only be a result of a rather special situation. On going into the matter we have come to the conclusion that the promotion policies (we are not commenting on recruitment policies) with regard to reservations (in respect of candidates/employees drawn from Scheduled Castes/Tribes) have gone much beyond the guidelines of the Government of India, with deleterious repercussions. The Railways, having drawn up their own detailed modalities in excess of the obligatory concessions, have created serious anomalies and frustration amongst their staff.

9.4. The constitutional provisions in this regard have been laid down in Article 335 of the Constitution which states that :

"The claims of the members of the Scheduled Castes and Scheduled Tribes shall be taken into consideration consistently with the maintenance of efficiency of administration, in the making of appointments to services and posts in connection with the affairs of the Union or of a State".

While a special quota for recruitment was immediately implemented in 1951, special provision for promotions were first introduced through a directive from the Ministry of Home Affairs in May 1955 regarding differential qualifying standards, and in January 1957 regarding special quotas. The relevant instructions from the Ministry of Home Affairs on this subject are given in Annexure A-8.3.

9.5. While there are general directives from the Ministry of Home Affairs, the broad features of the Railway's practice in dealing with promotions need to be delineated to understand the problems and anomalies which have arisen.

1. There is a 22.5 percent quota for Scheduled Castes and Scheduled Tribes for promotions. This has been converted into a ready-reckoner in the form of a "40-point roster",\*.

\* The standard 40 points roster is attached as Annexure A-8.4. With the help of this roster, the vacancies earmarked for

reservation on a continuous basis are immediately known without having to go into detailed calculations for each selection.



2. Wherever a promotion is on the basis of seniority-and-suitability, the pass marks for general employees are 50% while for employees in the reserved quota they are 40%. In the case of selections, the qualifying marks for general employees are 60% of the professional portion of the selection test, while they are 50% in the case of employees in the reserved quota. This relaxation in standard is, however, not applicable to selections involving 'safety' categories.
3. In the case of suitability tests, if no suitable candidates are found, 'the best out of the failures' are promoted for a trial period of six months, provided that they do not belong to safety categories. This system, which is peculiar to the Railways, provides for promotion on a trial basis for six months, at the end of which the controlling officer is required to submit a report on the working of the employee in order to either confirm or cancel the promotion. For Safety categories, there is a provision for special on-the-job training prior to a suitability test, but promotion on a trial basis is not adopted.
4. In the case of selections, while promotion of 'best out of the failures' is not permitted, the zone of consideration can be enlarged up to two grades below the prescribed level, with the permission of the Head of the Department. Such permission is invariably given in the absence of any guidelines on which discretion is to be exercised. This has frequently resulted in otherwise competent supervisors having to serve under their own subordinate staff and lose all enthusiasm for their work.

9.6. It is quite clear, that, in drawing up details such as promoting the best out of the failures, and enlargement of the zone of consideration up to two grades below, Railways have gone far beyond the directives of Government.

9.7. In its anxiety, the Ministry of Railways have failed to take care of the interests of administrative efficiency, the general morale of its staff, and the pervasive implications on the safety of the vast body of the travelling public. Even the ground slightly restreived in not applying the above policy to safety categories, has not helped very much because the Railways have been very strict in setting down what constitutes a safety aspect in Railway working.

9.8. It is, therefore, understandable that there is much discontent on this account in the Railways. Frequently, competent persons have been over-looked, and made to serve under their own juniors, who have been promoted on the quota system with a lowered qualifying standard. According to the evidence rendered to us, it is a moot point whether in practice, even the reduced qualifying standards are always achieved by persons selected from the reserved list owing to procedural problems. We are informed that in each case wherein the prescribed percentage of reserved candidates cannot be filled up in a promotion test, a detailed explanation has to be given and the selection committee are virtually put on the mat. Officers, therefore, prefer to push up requisite number of persons from the reserved list. The provision for special training is equally theoretical. The Railways already lack adequate

training facilities, as we have pointed out in Chapter IV, and have not had the wherewithal of the will to organise special training. Finally, in the case of promotions on a trial basis for six months, there is hardly a case of reversion after the review period, because of the fear of having to give detailed explanations and the reluctance of executive officers to throw themselves open to accusations of prejudice, or to expose themselves to the pressures that come from special interest groups.

9.9. In the light of not only lowered qualifying standards, but also further concessions, it is not surprising that there is a complaint of some dilution in competence in various aspects of railway working, though it may not be fair to put the total blame for this on such categories. Justice Wanchoo in his enquiry report of 1968 commented : "We have given thought to the question of reservation of posts and the weightage for Scheduled Castes and Scheduled Tribes in the promotion vacancies. It is true that Article 16(4)\* of the Constitution permits such reservation with a view to giving adequate representation to the relatively backward communities in the society. We are also aware that the principle of reservation of promotion vacancies was upheld by the Supreme Court. The provision in the Constitution and the pronouncement of the Supreme Court show the concern and sympathy for Scheduled Castes and Scheduled Tribes. These, however, have necessarily to be counter-balanced with the need for maintaining the efficiency of the administration at a reasonable level. It must be appreciated that reservations for a community or a group of people must not be at the cost of overall efficiency of the administration."

9.10. There is a further irrationality in the effect of the promotion policy based on reservations, that become apparent after a period of time. The quota for reservation is at each promotion based on vacancies, and not related to the communitywise incumbencies already existing. After successive promotions, in the higher grades the age group of Scheduled Caste and Scheduled Tribe candidates tends to become lower than their colleagues owing to their having jumped seniorities in the earlier selection process. Retirements, therefore, become faster in the higher grades amongst the general employees. The representation of quota employees, therefore, starts going beyond the prescribed percentage. As a test case we have examined a representation made by one of the recognised unions of Northern Railway to the Member Staff, Railway Board, concerning the seniority list of parcel and booking clerks of that Railway. We have found that in a seniority list of 37 persons in the highest grade, 28 are from among the Scheduled Castes and Scheduled Tribes. Of the general candidates, other than two, all will get superannuated before 1985, while the reserved quota candidates are comparatively young, having had successive promotions at a quick rate based on the 40-point roster.

9.11. The effect of such a policy is, therefore, that in the higher grades in some cases, there is a predominance of persons belonging to the Scheduled Castes and Scheduled Tribes and in effect, the avenues of promotion to general employees has been blocked off, far in excess of the prescribed provision of 22.5 per cent. No provision, however, exists in the Rules, to temporarily suspend implementation of the roster for promotion on this account.

9.12. In one of the most vital safety categories of the Railways, that of Controllers, we find that the represen-

\* Article 16(4) mentions backward classes in general.



tation of reserved categories on the Delhi Division is already 32 per cent in the case of those in the grade Rs. 700-900, and based on ages of superannuation, will rise to more than 50 per cent in the next 5 years. The important consideration of experience and competence has not found expressions in the policy as it has been implemented, even for those directly responsible for train running. In fact this analysis is borne out by some of the major Control organisations we have examined.

9.13. The effect on efficiency, therefore, cannot be ignored. One of the Chief Commissioners of Railway Safety was of the opinion that in posts where even a small element of safety is involved it would not be appropriate to give preference to any such category of employees in the matter of promotions.

9.14. We have, in principle, the greatest sympathy with the reserved categories. However, having taken all aspects into consideration we recommend that in keeping with the spirit of the directives issued the Ministry of Home Affairs, the Railways should take the following steps with regard to the reservation policy of promotion :

1. A minimum experience criterion be laid down for each promotion, equally applicable to all employees irrespective of whether they are in the reserved list or otherwise.
  2. The system of promotion on trial from amongst the best of failures be dispensed with.
  3. The zone of consideration should be the same for all employees viz., that of the lower grade, and the zone of consideration should not be enlarged by including even lower categories in order to fill in a quota.
  4. There should be a special emphasis on training of Reserved Categories.
  5. The Reservation policy should not apply in any form to the safety categories, because no relaxation can be permitted in matters relating to safety, as the hazards would far outweigh any other consideration. In this context, the Railways should examine the safety implications of the work of all staff of the Railways, by taking into consideration responsibilities fixed in past railways accidents, and refix the coverage of this term on realistic and pragmatic considerations.
- In particular it should be examined if the Safety categories should include inter-alia :—
- (a) All staff involved with train control.
  - (b) All staff involved in train formation and train passing.
  - (c) All driving crew and guards.
  - (d) All train examining staff and locomotive fitters and supervisors.
  - (e) All staff involved in permanent way maintenance.
  - (f) All staff involved in signalling work and communication.

## 10.0. Conclusions.

10.1. A well defined career plan is necessary for each category on the Railways, since this has important ramifications on recruitment and internal structure and will to a large extent determine the pace at which expansion and modernisation can be efficiently handled. A broad plan for future recruits, with the higher academic qualifications proposed by us, has been formulated. It should be possible to give the first promotion in about four years, subject to the suitability, and there should be a generally assured promotion to various levels for a person of average competence.

10.2. In order to make the plan work, some important changes are necessary, including the reduction of the percentage of unskilled staff on rolls. This is far too high for an organisation which wishes to modernise and incorporate improved technologies. Changes will also be necessary to permit retention of highly skilled persons for longer periods at their jobs, without financial loss to them, instead of shifting them to supervisory duties merely on account of seniority. Simultaneously, a quicker channel of promotion is desirable for really outstanding persons. These features have some implications on the cadre distribution. Since distortions invariably creep up on account of non-uniform expansions cadre review should be introduced for Class III staff every five years.

10.3. The recruitment of Class I Officers has been exceptionally high in the past three years. It is important that the recruitment is related to the cadre strength, since this has grave implications on morale and efficiency. Past history points out to the difficulty in maintaining reasonable service prospects whenever a large number of officers are recruited over a short span of time. Recruitment to meet an expansion should therefore be phased out.

10.4. Promotion prospects are dismal in the higher officer grades. Cadre reviews should be carried out strictly as per Government's decision, and a senior officer should be specially put on whole time for this job. He should make well reasoned recommendations taking into account the structural needs of the Railways. A great deal of expertise is available in the Railways which can be beneficially utilised by many Undertakings, and this would give the added advantage of better exposures to Railway Officers. The system of deputation should therefore be given greater encouragement.

10.5. In order to generate greater confidence, and also to give greater weightage to merit, the present system of alternate suitability and selection tests on the Railways should be dispensed with. For promotion of Class III staff at each grade, 75 per cent of the vacancies should be earmarked for seniority-cum-suitability, while the remaining 25 per cent should be purely on the basis of selection where no weightage for seniority should be given and this made open to all persons in the eligible grade. Similarly, for officers, the merit consideration should be given greater weightage at each promotion.

10.6. A numerical scale should be adopted for performance appraisals and the records computerised. Certain lacunae in the formats should be overcome. While formats have to be related to the needs of each individual category, in general, there should be some emphasis on the longer term perceptions of the individual, the attention he gives to training and organisation building activities, and his strengths and weaknesses.



with a view to determining future placements. Counselling should be resorted to invariably. Self-appraisals should be introduced for people involved in R & D work, since it is often difficult to assess their performance over a short period.

10.7. In implementation of the Reservation Policy, the Railways have in many cases gone far beyond the directives of the Ministry of Home Affairs. This has had serious repercussions with implications both on the efficiency of administration and morale of other workers. In some of these matters, which have been identified, the Railways should fall in line with the Government directives to eliminate those features which are neither mandatory nor desirable.

Annexure A.8.1

(Cf. Table 8.2)

**Number of Class I officers recruited annually in the Railways.**

Year of Examination	Total Number Recruited*
1950	52
1951	43
1952	31
1953	58
1954	74
1955	153
1956	193
1957	71
1958	79
1959	86
1960	107
1961	124
1962	123
1963	100
1964	71
1965	92
1966	85
1967	68
1968	62
1969	77
1970	72
1971	67
1972	67
1973	88
1974	107
1975	117
1976	108
1977	103
1978	132
1979	129
1980	285
1981	344 + 25 IRPS = 369
1982	Approx. 375

**Statement of Cadre Attrition (Mechanical Branch)\*\***

Year of Service	Strength taking account of wastage	Deputation Allowance 20%—8-21@ year and 12½% beyond 21 years	Net Available
1	100.0	Nil	100.0
2	99.2	Nil	99.2
3	98.4	Nil	98.4
4	97.6	Nil	97.6
5	96.8	Nil	96.8
6	96.0	Nil	96.0
7	95.2	Nil	95.2
8	94.4	Nil	94.4
9	93.6	18.72	74.88
10	92.8	18.56	74.24
11	92.0	18.40	73.60
12	91.2	18.24	72.96
13	90.4	18.08	72.32
14	89.6	17.92	71.68
15	88.8	17.76	71.04
16	88.0	17.60	70.40
17	87.2	17.44	69.76
18	86.4	17.28	69.12
19	85.6	17.12	68.48
20	84.8	16.96	67.84
21	84.0	16.80	67.20
22	83.2	10.40	72.80
23	82.4	10.30	72.10
24	81.6	10.20	71.40
25	80.8	10.10	70.70
26	80.0	10.00	70.00
27	79.2	9.90	69.30
28	78.4	9.80	68.60
29	77.6	9.70	67.90
30	76.8	9.60	67.20
31	76.0	9.50	66.50
32	75.2	9.40	65.80
33	74.4	9.30	65.10
34	73.6	9.20	64.40
35	72.8	9.10	63.70
Total		367.30 say 370	2,588.78 or say 2,590
Grand Total 2960			
Hence recruitment in a static situation			
100			
————— = 3.37 or say 3.4%			
2960			

\* This includes Special Class Apprentices recruited in other years but with corresponding seniority. All figures exclude the Medical Branch.

\*\* This is a case study of one branch but figures indicate its general

applicability.

@ This percentage has been arrived at on the basis of actuals over the past twenty years.



## 40 Point Roster

1. *Memorandum No. 2/11/55/RPS dated 7th May 1955.*—Where promotion is made on the basis of seniority subject to rejection of the unfit or subject to passing departmental tests of a qualifying nature, Scheduled Castes and Scheduled Tribes officers, should be judged sympathetically and the standards applied to them need not be unduly high.

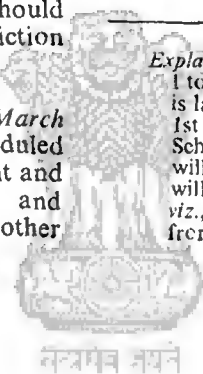
2. *Memorandum No. 5/4/55 SCT-1 dated 4th January 1957.*—In the interest of securing uniformity of practice and procedures, it has now been decided that the principle of reservation should be extended to all grades in all services which are filled by promotions through competitive examinations limited to departmental candidates, and the quantum of reservation in each case should be the same as has been prescribed for posts filled by direct recruitment through open competitive examinations viz., 12½ per cent for Scheduled Castes and 5 per cent for Scheduled Tribes.

3. *Memorandum No. 2/24/63. Estt. (D) dated 4th December 1963.*—While orders have been issued that unfilled reserved quota vacancies should be carried forward up to two years, it should be ensured that reservation in any one individual year does not exceed 45 per cent. The balance beyond 45 per cent should again be carried forward subject to the time restriction of two years.

4. *Memorandum No. 1/9/69-Estt.(SCT) dated March 1970.* The percentage of reservation for Scheduled Castes and Scheduled Tribes are raised to 15 per cent and 7½ per cent for posts filled by open competitions and 17.5% and 7.5% respectively for recruitment by other than open competition.

<i>Vacancy Numbers reserved for Scheduled Castes</i>	<i>Vacancy Numbers reserved for Scheduled Tribes</i>	<i>Vacancy Numbers Unreserved</i>
1	4	2 23
8	17	3 24
14	31	5 25
22		6 26
28		7 27
36		9 29
		10 30
		11 31
		12 32
		13 33
		15 34
		16 35
		18 37
		19 38
		20 39
		21 40

*Explanatory Note.*—Vacancies are continuously numbered from 1 to 40 and then the cycle is repeated if the number of vacancies is larger. For example, if actually there are 10 vacancies the 1st and 8th are earmarked for Scheduled Castes and the 4th for Scheduled Tribes, while vacancy Nos. 2, 3, 5, 6, 7, 9, and 10 will be unreserved. Later if twenty more vacancies arise they will be numbered from 11 to 30 and the next twenty in two lots viz., 31 to 40 and 1 to 10 and the reserved posts identified from the roster.





## CHAPTER IX

### MORALE AND MOTIVATION

#### 1.0. Introduction.

1.1 In this Chapter we deal with morale and motivation to conclude with the over-riding importance which needs to be given to this aspect in Personnel Policy. Specific areas have already been covered earlier, in the portions dealing with manpower, grievance redressal and career planning. Each one of these aspects has an important role to play, but they, in a sense, look at personnel affairs from the view point of the management. We would now like to cross the line and examine the perceptions of the individual worker himself.

1.2. We believe that most people can be self directed if they become committed to an objective they value. This personal commitment is particularly necessary for the many attributes of customer satisfaction such as courtesy, patience, cleanliness and the inclination to help, which cannot in many cases be enforced by administrative fiat.

1.3. Indeed we consider that it is impossible for a million and a half employees to work in harmony, and towards common objectives, unless they are fully motivated, confident of the results of their efforts, and have a sense of pride and belonging to the Railways.

1.4. To nurture the high level of morale necessary for this purpose we have determined three areas deserving of special attention. These are;

1. Communication
2. Motivation for productivity and Recognition of Merit.
3. Welfare.

1.5. We would like to take up each) of these in some detail. Let us make it clear that in this chapter it is neither our intention to deal with the scales of pay nor with the allowances. Which we believe are subjects pertaining to the National Pay Commission, but with the hard-core concepts relevant to a meaningful programme for motivating railwaymen for greater efforts and for keeping their morale high.

#### 2.0. Communication.

2.1. Many of the ills in labour Management relations arise from a lack of easy availability of authoritative information. In a non-informative atmosphere, rumours and half-truths tend to gain credibility and there is always suspicion that the management is playing a devious game. This is particularly true when there is queue situation for benefits.

2.2. The problem of communication in the railways is compounded by the very dispersed nature of the organisation, and the extent of illiteracy amongst many categories of railway staff. The written word in this

situation is not always an effective means of communication, specially for workers such as gang-men who function far away from yards, stations, and large offices.

2.3. Considerable research is needed for this purpose and there should be no hesitation in exploring unorthodox avenues. The Personnel Research Cells proposed in Chapter VI should apply themselves to this issue. We have made some suggestions in this regard later in paragraphs 2.7 to 2.13. We have already dealt with the induction process in Chapter II. It is envisaged that, during induction, each new employee will be informed on all basic matters relating to his service conditions, welfare measures and grievance redressal machinery.

2.4. This is to be supplemented by providing each employee an induction booklet\* in simple language to cover basic rules and regulations applicable to him. It is hoped that with such a procedure the new recruit would be made aware of the broader aspects governing his service conditions, and would be in a better position to look after his interests, instead of being guided by rumours and half truths, often exaggerated by unscrupulous elements both within and outside the railways.

2.5. This is, however, only the first stage. After the basic information has been imparted it should be incumbent upon the administration to make deliberate efforts to disseminate information periodically to all employees concerning their status with regard to the many important features which change from time to time. We have particularly in mind housing, promotion avenues, confirmation, availability of holiday homes, educational assistance, loans and advances etc.

2.6. We understand that there is constant pressure on personnel establishments and subordinate offices from workers to find out how they stand. There is also, unfortunately, a general feeling that there is much scope for lobbying and pushing individual cases.

2.7. We recommend that the relevant information and seniority lists be put up on notice boards with suitable periodicity, depending upon the type of information; if possible, atleast once a year. We learn that at a few places where this is regularly done few grievances arise. On the other hand, at most places there is constant suspicion that records have been tampered with to favour an individual, or a set of employees.

2.8. The rules regarding these matters also need to be rationalised so that a common policy is followed for all staff under a unit of administration. A case in point is the distinction between essential\*\* and non-essential employees for housing purposes, and the provision made for non-pooled ( earmarked) accommodation. In some areas, there is a provision for a per cen-

\* Chapter IV Para 4.1.

\*\* Certain staff are categorised as 'Essential' for housing purposes. These are generally those involved with running of trains and

direct maintenance of assets. Ministerial staff and those in artillery trades are generally "Non-essential" and may go through their full careers without even qualifying for railway housing.



tage of quarters to be allotted to non-essential employees while at others, no non-essential employees can be provided official accommodation until all essential staff have been housed a condition which has never yet been met.

2.9. Furthermore, there is provision for an accelerated allotment to Scheduled Castes and Scheduled Tribes, Territorial Army personnel etc. from the non-essential quota. Since, at most places there is no chance of non-essential staff ever coming within the zone of consideration, this provision is theoretical and frustrating. There are also constant changes being made in the categories entitled to non-pooled accommodation by housing committees, creating an impression that rules are made to suit individuals rather than the system. Simplicity of rules, and uniformity of policies, are essential to create a healthy climate.

2.10. We have noticed that the number of circulars issued by the Railway Board and the Zonal Railways, dealing with personnel matters, is so large, that even in Personnel Branch offices, authoritative up-to-date information is frequently unavailable. This creates confusion, conflict, and frustration. The management must ensure that all orders are sufficiently researched to make frequent amendments unnecessary\*. All the Zonal Railways and Divisional Headquarters should create one cell of personnel circulars, purely for reference.

2.11. Each year, the summaries of all orders issued during the year should be printed with suitable indexing, and circulated to all concerned. Every five years, updated manuals and codes may be reprinted and the earlier ones withdrawn from circulation.

2.12. The question still arises of how to ensure communication with lowest levels of the organisation, especially those that are semiliterate or illiterate, and are based at road-side stations. We have proposed elsewhere, strengthening of the personnel department with an adequate number of Welfare and Personnel Inspectors. Once in three months, the visit of these Inspectors to road-side stations should be communication-oriented. They should carry relevant information to convey to each employee the prospects of his promotion, giving adequate warning to be prepared for promotional tests, discuss the possibility of attending training programmes, and availability of various welfare facilities.

2.13. It may be noted that this arrangement envisages a shift from administrative directives to counselling, and the management accepting a fair measure of responsibility for informing its employees through personal contact. Greater reliance on audio-visual aids and other such techniques can also be made in specific areas. The Unions too have a role to play which we hope they will assume more actively.

2.14. Grievance redressal is a vital area on which we have commented earlier in Chapter VI. We have made some recommendations to reduce the volume of grievances by improved procedures. It is important that the worker feels that his complaint has been studied with due care at the appropriate level, and has not gone by default. We learn that it is not uncommon for many reminders to be sent before a reply is received, which involves much irritation and waste of time, on both sides, and there is no formal system of monitoring that

a reply is given in each case. It is not our intention to increase paper work unnecessarily, especially with regard to frivolous and unreasonable complaints. Nonetheless, the worker should be confident that his complaint has been registered and considered. Routine replies, or no replies, do not help to create such an impression.

2.15. The Personnel Inspectors should be brought more actively into the grievance machinery and specifically charged with communicating to the employee the correct position. Complaints tend to become complex if they are not dealt with in time, and can also be considerably lessened if there is regular information made available to the employees.

2.16. The present arrangements for auditing and updating employees records, are not satisfactory. In order that employees representations are quickly processed we recommend that service records should, at no stage, be allowed to become more than a month behind. Examining the progress of updating service records, should be a specific function of the Personnel Branch Officers and section-heads.

2.17. Better communication is called for in one other area. This relates to needs arising out of organisational objectives and the advantages of stimulating staff motivation for policy implementation. Dissemination of information of this type is a vital productivity input. The Railways should ensure that wherever changes in practice, procedure, operating strategy, technology etc. are planned, workers are made to appreciate them in advance, and bring the full weight of their own experience and sense of commitment to bear in the innovative processes.

2.18. This can best be done by adopting a system of Briefing Groups. In the first instance, an attempt should be made to bring all supervisory staff within the ambit of the scheme. A system already exists for periodical meetings of senior subordinates with Branch Officers to review performance and facilitate coordination. We recommend that these same senior subordinates are identified as Briefing Leaders. The subjects for briefing should be determined by the management, and discussed with the Briefing Leaders during the regular meetings mentioned above. The Briefing Leaders, in turn, should have a formal information dissemination session with all their junior supervisors. This needs to be done once or twice a year.

2.19. In the various Reports of the Committee, we have emphasised the profound changes that the Railway system would necessarily undergo in the coming years, both in its hardware and its method of work. Much retraining, redeployment and re-location will be involved. Management policy has, therefore, to be clearly explained to the employees and there should be a two-way traffic of ideas.

### 3.0 Motivation and Productivity.

3.1. In broad terms, there must be some correlation between performance and rewards for individual and group excellence in performance. We realise that in an organisation like the Railways, with constraints arising out of its departmental status, the freedom to provide incentives is limited. There are also many difficulties in adopting an equitable system to apply to

\* We have been told of cases involving several amendments of a rule in a single year.



1.5 million workers belonging to over 700 categories. Nonetheless, the Railways have a measurable output and it should, therefore, be possible to think of ways and means to introduce a result oriented system of rewards.

3.2. There have been, so far, two attempts to establish productivity-linked incentives. In the mid-fifties, the Workshop Incentive Bonus Scheme was introduced, commencing with the Chittaranjan Locomotive Works in 1954. We have already brought out in Part V of our Report that, although there were significant gains initially, the scheme has become increasingly ineffective in achieving its aim. In fact it affected quality, and even gave rise to wide-scale malpractices\*. We had recommended that an Expert Group be set up to suggest ways and means for Workshop performance to be more realistically linked with incentive bonuses. This should be done.

3.3. The second major scheme was initiated in 1977-78, with the introduction of the Productivity-Linked Bonus for all railwaymen. Bonus was a long outstanding demand of railway staff, who argued that they were entitled to be covered under the Bonus Act. This was initially unacceptable to the Government. A compromise was finally found by linking Bonus, notionally, with productivity as measured by the total transportation output, using 1977-78 as the base. The formula, as it exists today, has little relationship with real productivity, since it does not take into account any inputs such as financial investments, staff strength or technology changes. The Comptroller and Auditor General of India in his report of 1979-80† observed:

It would be seen that productivity went down during 1979-80. However, while an amount of Rs. 31.06 crores was disbursed during 1979-80, on adhoc basis, as exgratia payment in lieu of productivity-linked bonus for 1978-79, during 1980-81 an amount of Rs. 47.62 crores, being 23 days wages was disbursed as productivity-linked bonus for 1979-80. In this scheme, no allowance appears to have been made for the potential for improvement on the basis of additional capital investment made from year to year."

3.4. Perhaps the most damaging feature of the existing scheme is that it only compares total output from year to year, without relating it to staff strength. The anomaly arising out of this is that even if the output (as measured by Net Tonne Kilometers of Goods Traffic and Passenger Kilometers of non-Suburban Traffic) remains constant, if the staff strength keeps increasing, bonus payments to each worker remain unchanged and the Railways pay out a larger amount as bonus without the benefit of increased output or efficiency. On the other hand, if the output is maintained constant by reducing staff, the workers get no benefit, and the Railways pay out less. We fear that a situation could arise, where labour might develop a vested interest in increasing staff strength disproportionate to output.

3.5. The Productivity Linked Bonus is slated to come up for review during the current year and the Ministry of Railways should ensure that the pitfalls of the scheme are not perpetuated. The subject requires a great deal of research and would have been an important part of the functions of the Personnel Research Wings proposed in Chapter VII, had they already been in existence. For the immediate, however, the Railways should consider adopting a norm of

the Traffic Tonne Kilometers per employee, excluding those in the Production Units and construction projects.

3.6. This does make the calculation a little more complex than now, but will give a more apposite measure of productivity. In case of any problems preventing adoption of such a basic change at short notice, we recommend that the base year for the bonus calculation be altered to the output of 1981-82, until the next review.

3.7. We consider that development of a better productivity norm for payment of bonus is not enough. The total output of the Railways is too amorphous to stimulate an individual, or a group of employees, towards higher effort. For example, the staff of the North Eastern and Northeast Frontier Railways, for the time being, can be excused for thinking that their performance will have little or no bearing on bonus payment. We recommend, therefore, a phased change of the formula to devolve upon the performance of individual Zonal Railways, and later, each Division.

3.8. The idea is that the output of the particular Zone/Division be compared with its own performance in the base year, rather than that of the Railways as a whole. We expect that with a more intimate relationship, individual officers and staff, and even organised labour may develop a certain measure of interest in achieving higher mobility and utilisation of assets.

3.9. There is another, and more traditional, form of linking productivity with performance in the form of Running Allowances for running Staff. These Allowances are related to the total kilometrage worked, and supposedly provide an incentive to drivers and guards to cover longer distances during their duty hours, by superior performance. Purely on technical considerations, it is doubtful whether, in a system of controlled operation, there is much driver or guard can do to increase output, although much can be lost by his recalcitrance. On the other hand, there is no doubt that some compensation is justified on account of the hard and unsettled life of such persons. The allowance structure of Running Staff has been examined from time to time and has been liberalised most recently in 1980. We do not wish to make a specific recommendation on this highly complex subject, but would like to caution that both very low and very high Running Allowances have their pitfalls and can even serve as disincentives. Should the Allowance be too low, there is lack of motivation for a man to leave his home for a number of days, and he tries to find excuses for being unavailable. If they are too high, this creates great disparities between different types of staff and makes drivers reluctant to accept many important stationary jobs, even on promotion.

3.10. From time to time, local efforts have been made to introduce incentives for higher productivity, notably in some marshalling yards. Judging by the experience of the Workshop Incentive Bonus Scheme, we would caution against uncontrolled individual efforts, however laudable the objectives may be. Divisional Railway Managers and other senior executives should be free to set up some competitive interest between common groups, but this should not be related to any heavy payments, or regular system of monetary incentives, which may gradually assume the status of formal policy.

\* Cf. Chapter V, Paragraph 11, of Part V.

† Laid in the Lok Sabha on 6th May, 1981.



3.11. We note that at some places, group awards, of a not very substantial amount, have periodically been provided for exceeding targets of traffic, loading etc. The benefit of these laudable schemes, has been to bring about a sense of participation, mutual understanding and recognition, rather than any significant additionality to wages. We feel that this is a correct approach and should be more widely practised.

3.12. While the wider and generally applicable group incentives serve a purpose, by themselves these are not enough. It is essential that persons who are, by nature and commitment, high achievers, are provided with the proper climate to advance faster, and exercise their talent on a wider plane. To achieve this end we attach importance to a well ordered system for recognition of individual merit.

#### 4.0. Recognition of Merit.

4.1. In any group of people, there are always some individuals, who by virtue of temperament, intelligence and application stand out in contrast with their colleagues. Such persons are prime assets for any organisation and tend to gravitate towards the more challenging and difficult jobs. We have found no evidence of a system for a meaningful recognition of their merit, or giving such individuals benefits of any lasting value. They wait in the same queues as the rest of their colleagues for higher pay-scales, promotions and welfare benefits. Their lives, in fact, often become a drudgery because of reluctance to release them for courses of shifts of any kind. According to evidence tendered to us, the more competent people in the Railways are often the most frustrated lot.

4.2. Our recommendation that 25 per cent of the vacancies at each promotional level be filled through an open competition amongst all persons in the lower grade, instead of following a strict seniority plan, would go a long way in rectifying the situation. The modalities for filling these vacancies in each grade need to be worked out with care. While a written test and interview would be essential, enough weightage should be given to the performance appraisals in the overall grading. We recommend that the performance record should form a component of thirty per cent in the evaluation, and performance records of the past five years (and for an extended period to take into account reports under atleast two different superiors) be taken into consideration. One great advantage of this accelerated channel of promotion would be for the really outstanding people to rise to higher levels at a relatively young age.

4.3. There are many attributes of performance which may not get reflected in the promotion policy or system of rewards, which are, nonetheless, of a positive value. One of these is attendance. During the visits of the Committee to various Workshops, we found absenteeism generally at the level of about twenty five per cent. A good way to combat this would be to provide some recognition for regularity at work. To this end, we suggest the institution of momentous, such as wrist watches, transistor radios etc. for those persons whose attendance record meets acceptable levels over a period of five years or so. The same kind of an approach should be followed for persons who have devoted a certain amount of time and effort to various types of voluntary, welfare-oriented work, in addition to their normal duties. House-Journals, Railway magazines etc. should more actively publish citations and write-ups of such otherwise unnoticed individuals.

4.4. We have found that, in certain categories of staff involved in operational safety, such as yard staff, station staff, drivers, loco, carriage, and wagon fitters etc. there is a very heavy incidence of penal action, such as censures, stoppage of increments etc. on account of unsatisfactory performance. We have gained the impression that in many of these categories, it is virtually impossible to find a man who has not been charge sheeted under the D & A Rules over a period of ten years or so. It stands to reason that to counter-balance such penal action, there should also be a system of recognition for persons with a clean slate. To this end, we recommend a system of awards on the same basis as for attendance.

4.5. We consider that motivation is indispensable to create efficiency. On the Railways, however, the whole system is overwhelmingly geared to punishments without providing concomitant incentives for individual excellence. The suggestions we have made in the preceding paragraphs only throw up some of the directions towards which the Railways can explore and innovate. There are a large number of schemes for reward and recognition adopted in various organisations in the public and private sectors the bulk of which have little financial implication. This is a matter, therefore, for continuous research, and for development of insight into the most effective ways to motivate different types of employees with varying professional and personal backgrounds, and ethnic differences in their value systems. The proposed Cells for Personnel Research should go into these aspects.

#### 5.0. Staff Welfare.

5.1. Amongst the various Government departments except for Defence, the welfare concept is perhaps, most developed in the Railways. From their very inception, due presumably to the concentration of employees at purely Railway township with no civic facilities, the Railway evolved a policy to provide a measure of housing, recreational facilities, medical services, schools etc. Later, especially after the 1950's medical facilities have been vastly extended and new schemes such as provision of holiday homes, subsidised hostel facilities for children of employees etc. have been initiated.

5.2. While there are several well-conceived welfare schemes on the Railways, the level of supervision appears to be inadequate. In paragraph 5.5 Chapter VII dealing with Personnel Organisation, we have brought out the need for provision of separate welfare officers at appropriate levels, both at the Zonal and Divisional Headquarters, and separation of the welfare function from grievance redressal. We have felt that grievances arising out of service matters, whether relating to non-payment of dues, seniority, grant of leave etc. should be considered as service matters, to be redressed through the agency of Personnel Inspectors, who would function as a part of the grievance machinery. The Welfare Inspectors should devote themselves entirely to genuine welfare matters, especially housing, colony cleanliness, recreational facilities, sports, group excursions etc.

5.3. Many welfare activities such as the running of railway institutes, recreation clubs, craft centres, staff canteens, distribution of grants from the staff benefit fund etc. are already managed to a large extent by a Committee of users. This is a healthy trend, and increasing encouragement should be given for the staff to manage their own schemes. This should however not have any link with trade unions.



5.4. There are two aspects of staff welfare which have the most profound effect on the sense of well-being of an employee. These are housing and education of employees children.

5.5. At present, the Railways have provided housing for about 37 per cent of their staff. This is favourable in comparison with many other Government Departments, but it does not fully reflect the special needs of the Railways, whose employees work on a round-the-clock service. The figures are deceptive, in any case, since there is, necessary, almost a hundred per cent housing for staff at wayside stations and block huts, while the housing position is much less for those concentrated at larger work centres. In this context note should be taken of the difficulties arising out of increasing urbanisation, spiralling rents, and the very conservative level of house rent allowance paid to Government employees. We are particularly concerned about categories, such as Drivers, Assistant Drivers, Guard's, Coach Attendants, Travelling Ticket Examiners etc. who do not get more than a few days a month with their families.

5.6. The real problem is resources. The Railways have been setting aside approximately Rs. 10 crores annually, for housing, and this adds hardly 2,500 dwelling units per year. At this rate, raising the proportion of staff housed to just 40 percent, would itself take more than 15 years. Means, therefore, have to be found to raise resources for this purpose. One suggestion made to us is that part of the balance under the Group Insurance Scheme introduced in January 1982 be made available in the form of loans for house construction/purchase. This may be pursued. The Railways should also explore the possibility of augmenting house building activity through institutions such as HDFC, UTI, LIC etc. The best way to do this would be for the railways to act as a guarantor, or else enter into back to back arrangements with both the employees and the financial institutions.

5.7. The Railways have a vast amount of surplus land,\* and some of this can be identified for government housing, after taking into account the needs of expansion and new activities. Land should not, therefore, be much of a constraint for house building.

5.8. In para 3.5, we have suggested that a part of the Productivity Linked Bonus may be dispersed in the form of non-monetary benefits, and we had particularly housing in mind. The Possibility of working out such an arrangement should be explored in consultation with the recognised Labour Unions.

5.9 The allotment of funds under the Plan-head 'Staff Quarters' is meagre and has to be substantially raised. In addition, in order to step up the availability of housing for railway staff, adequate provision for staff quarters should be made in the estimates of all new projects. Depending upon local conditions, and especially where there is already an acute housing shortage, there should be no hesitation in making full provision of quarters for permanent staff likely to be deployed on commissioning of the project.

5.10. Some of the rules relating to housing loans need re-examination. We find that the amount of loan and the criterion for total cost of house construction is no longer related to present day costs and inputs. @ This has discouraged people from building homes and,

often, the scope of construction stops short of being a full dwelling unit.

5.11 While the loan amount may continue to be at maximum of 75 months basic salary, the upper limit of loan amount should be raised from Rs. 70,000 to Rs. 2.0 lakhs, and the total cost of construction should cease to be a criterion for eligibility.

5.12. Education.—We find great reluctance amongst railwaymen to accept transfers, often even on promotion. We learn that this largely on account of difficulties arising out of the education of children. With a general shortage of school seats in good institutions, and also difficulties imposed by change in the medium of instruction, the education of children is a major consideration at the time of transfer. Expansion of Central Schools is therefore, the obvious answer.

5.13. Ideally, each Division on the Railways should be provided with atleast one Central School. Since it may not be possible to ensure this in the near future, the Railways should take upon themselves the job of building schools to the same scales as the Central Schools, with a view to handing over the responsibility for running to Central Schools in stages. These schools should be provided with hostel facilities, limited to wards of Central Government employees not posted at the same station, and appropriate budget allotment should be made to create such a net work.

5.14. In addition, in major cities and towns, the Railways should enter into a regular system of financial support to certain schools and colleges who would, in turn, reserve a number of seats to wards of railway employees, in each class.

5.15 With regard to officers, we recommend that the scheme of educational assistance followed in the Defence Services is studied. Broadly, the scheme involves debiting each officer a small amount from his monthly salary, from the very start of service, to create a fund and reimbursing from this a suitable amount during the school-going-years of the officer's children. The amount is higher if the children are put into boarding schools. We believe this can be done without the Rlys. putting up any of their own funds for this purpose.

## 6.0. Employment assistance.

6.1 Many persons have suggested to us that the Railways should give preference in employment to the wards of their own employees. It has been argued that this would be the single most effective incentive for staff to ensure their devotion to the system. The Railways would also have the advantage of recruiting young people who have grown up in the railway atmosphere. The Committee, however, cannot endorse this idea since, in a sense, this would infringe the basic concept of equality of opportunity enshrined in the Constitution. Preferential recruitment, therefore, has to be limited to special cases and on a very limited scale.

6.2. The Railways should, however, introduce vocational training as part of their welfare measures. These training schemes should be geared to bringing the wards of railway employees up to requisite standard in the trades in which the railways make large recruitments, so that the dependents of railwaymen have a better chance of qualifying in recruitment competitions. This is specially necessary because railwaymen are

\* Cf. Part III, Para 1.1.

@ We are aware of the recent liberalisation in the ceiling limits.



transferable and are frequently posted at places where the educational facilities are poor.

### 7.0. Morale of Supervisors.

7.1. At present, senior supervisors are competent to take action against staff, under the D & A rules, for certain minor penalties only up to the lowest level of Class III staff (pay-scale Rs. 260-400). There is no provision for any grade of supervisor to take action relating to a major penalty, or a minor penalty involving the withholding of passes etc. even for Class IV employees. This is an unsatisfactory state of affairs, as it has led to feeling amongst staff that the supervisors cannot really take any worthwhile action against them. All such cases require to be put up to an officer, often in another city, and takes many weeks to finalise. We have examined the delegation of powers and recommend that they be modified in accordance with the suggestions made in Table 9.1 below.

Table 9.1

<i>Supervisory Category</i>	<i>Level of staff upto which major penalty action can be taken</i>	<i>Level of staff upto which minor penalty action can be taken</i>
Key Supervisors (Rs. 840-1040/1040-1250).	All non-supervisory staff (Pay scales not rising beyond Rs. 560/-).	All staff in grades not rising above Rs. 750/-.
Senior Supervisor (Rs. 700-900).	Staff upto lowest grade of Class III (Pay not rising beyond Rs. 400/-).	All staff in grades not rising above Rs. 700/-.
Supervisor Rs. 550-750).	Nil	All staff in grades rising upto Rs. 560/-.
Supervisor Rs. 425-700).	Nil	Nil

7.2. Punishments should only be imposed by the competent authority as per our recommendation, and not at higher levels, so that the authority that we have sought to impart is not diluted in any manner.

7.3. In the final analysis, the authority and status of the supervisor will be established not only by the powers they wield, but the respect with which their staff learn to look up to them. We have sought to give the supervisor a role in the induction/counselling of new recruits with this aspect in mind, and we hope that in the years to come, employees will look up to their supervisors with respect, and gratitude also, for their early moulding and guardianship when they first entered the service.

### 8.0. Morale of Officers.

8.1. To a large extent, the attitude of officers is bound to percolate through the entire organisation. We have not found the morale of managers of a high order. We have spoken to a large number of officers and found, among many of them, a sense of pessimism and frustration, and sometimes even boredom in their approach to work. There is a pervasive feeling that while they have been sorely tested and have put up with much inconvenience and hardship, the job content does not permit them to exercise their potential talent and the avenues of advancement are poor. It is unrealistic not to expect them to compare themselves with their collaterals in other walks of life, for whom perquisites have generally been on the increase, while on the Railways, there has been a tendency towards withdrawing them.

8.2. Lack of richness in job content is primarily on account of little emphasis on innovation, modernisation and adoption of new technologies. This has led, over the years, to increasing of routine administrative work instead of professional application. It is hoped that with the emphasis we have laid on modernisation and technical advances, this position will change. We have also made recommendations in Chapter VIII regarding Career Planning and Promotion Policy which, if implemented, will ease the sense of frustration to a substantial degree. We would like to strike a word of caution, however that the manner in which upgradations have been sanctioned in the past have frequently led to lowering the morale amongst senior persons who have stagnated for long periods. Under the procedures that have been followed in the past, persons with a difference of up to five years in date of recruitment have all been brought on to the same scale starting at the bottom. Whereas the relatively junior persons, have a sense of relief, this only adds to the frustration of their seniors. We are, however, more concerned here with other aspects of personnel policies governing officers, which, though often individually small, add up to a general sense of distress and resentment.

8.3. Over the years, many facilities and conveniences have been eroded. In many areas such as mode of travel, amenities provided on transfer, accommodation while on tour, educational assistance etc. the railway administration has been conservative and has been concerned with economising often at the cost of efficiency and morale.

8.4. As a group, officers are the most transferable category and tenures are normally rather short. This is neither in the interests of work, nor of morale, and we have already commented upon this. Transfers, if made too frequently, must be looked upon as a major dislocation of family life. There is, therefore, also need for an in-depth examination of the transfer policy. We recommend that :—

1. There should be a clear policy on tenures, and all officers should take turns in the hardship postings.
2. Transfer allowances should be related to real costs incurred. These should cover the cost of professional packing services, transport and labour.
3. Family transit accommodation should be provided at all Divisional and Zonal headquarters for persons awaiting house allotment, whether on account of shortages, or for completion of an academic session, (where this is not taken into consideration while making the postings).

8.5. The Railway Board would do well to study the prevailing scale of various facilities in other departmental undertakings, as well as the special requirements of the Railways. Provision of accommodation during duty out of station is a specific case in point. With the Railway Board, the Headquarters of five Zonal Railways, six Divisions and large number of other organisations of the Railways operating from the metropolitan cities, the number of officers required to visit these places is large. We understand that even senior officers find it difficult to get rest house accommodation, and by and large, the junior officers have to fend for themselves. Even when accommodation is available, there is no catering facility and there is lack of an organised system for transport.



8.6. We recommend that in atleast the metropolitan cities and other important places, such as Lucknow and Secunderabad, rest house accommodation, to an adequate scale, should be arranged based on a study of the number of persons ordinarily requiring such accommodation. The rest houses should be provided with arrangements to serve meals on a no-profit basis. As far as transport is concerned, if sufficient vehicles are not available, the rules should be liberalised so that essential movement does not create out-of-pocket liability and the procedures for reimbursement are simple, and based on the officer's personal certification. The rules for transport reimbursement should cover the requirements from residence/place of stay and not from or to the office location.

8.7. We have found that the morale of railway officers posted to the Northeast Frontier Railway is particularly low. They have a sense of isolation and deprivation from ordinary facilities even during periods when conditions are stable. There is, therefore, a need to make certain special provisions for such persons in order to compensate them for the hardship and give them a sense of pride in their special status. We shall deal with these and other aspects relating to Northeast Frontier Railway in a subsequent report.

8.8. In summing up the plight of railway officers, it would be in order to refer to the great emphasis we have laid in our various Reports on modernisation, R & D, and the need for constant innovation and productivity improvement. It would be necessary in this context for the Railways to attract competent persons who get a sense of fulfilment in following a career in the Railways. During our various visits and discussions, we have gathered the impression that the existing conditions are not conducive to the kind of atmosphere that is necessary. We, therefore, consider that the motivation and morale in the nation's biggest public utility, and which is one of its largest industries, should be given the importance which is its due in line with the modern managerial practices.

## 9.0. Conclusion.

9.1. In the final analysis, it is the morale and motivation of officers and staff of the Railways which will determine its performance and ability to deliver a service to the expectation of the nation. Apart from the many areas already covered in the Report, there are three important facets of personnel policies which have far reaching effects on the attitudes of employees. These are : communication, recognition of merit, and welfare services.

9.2. Good communication ensures that employees understand the rationale behind rules, and rely on the fairness of the system. Apart from induction/initial training, the issue of induction booklet, the Railways should also make continuous endeavours to keep staff well informed of the various aspects concerning them such as how they stand with regard to housing, promotion, confirmation, loans etc. These should be regularly put on the notice boards. Personnel and Welfare Inspectors should play a positive role, especially for staff who are illiterate. There should be a regular system of communication-oriented visits to way-side stations.

9.3. Rules and Regulations should be well thought out and simple, and uniformly applicable to all staff

under a unit of administration. Frequent amendments or revisions, should be avoided. An annual summary of all circular relating to personnel matters should be issued with suitable indexing and the Manuals/Codes reprinted every five years.

9.4. For communications with regard to policy implementation, Briefing Groups should be set up, whereby senior subordinates are specifically charged with informing employees at lower formations.

9.5. The relationship between performance and rewards needs to be more clearly established. The Productivity-linked Bonus Scheme has not served its purpose, and it should be re-cast taking into account the increasing physical inputs over the years. The best way to do this would be to relate bonus payments to transportation output per capita, and periodically update this. Furthermore, in order to bring in a greater sense of participation, the Scheme should be decentralised, based on the performance of individual Zones and Divisions, instead of a single policy for all Railways. There is also need to introduce a system of recognition of employees for features such as attendance, voluntary work etc. This can be done at low cost. This matter should be continuously researched.

9.6. Among the various welfare measures, housing and education are the most important. Improvement in quantum and quality housing is limited by shortage of funds. Means, therefore, have to be found to increase this. The Railways give housing loans only within their own resources, which are inadequate. They should pursue various schemes and with organisations such as LIC, HUDCO, Unit Trust of India etc.

9.7. For education, schools with hostel accommodation, to the scale of Central Schools, should be set up at each Division to cater for transferable employees. They may be handed over to the Central School Authorities whenever possible. For officers, educational assistance schemes of the type adopted in the Defence Services, should be considered.

9.8. The morale of supervisors has suffered much over the years and it is vital that they are regiven the primacy they once held in the organisational structure. To this end, they should be delegated some authority under the Discipline and Appeal Rules.

9.9. The morale of officers is also found to be very low on various counts, particularly on issues arising out of career prospects and transfers. A clear policy on transfers should be evolved and transfer hardship eased through many measures suggested and by provision of adequate family transit accommodation at the various Zonal and Divisional headquarters.

9.10. In general the facilities given to Railway Officers have been reducing over the years and need appraisal. This is especially in relation to duty visits to the metropolitan cities and larger towns where both accommodation and transport infrastructure is inadequate.

9.11. The problems of officers posted to Northeast Frontier Railway are particularly grave. These have to be alleviated both through the transfer policy and a pragmatic look at the facilities made available to them.



## CHAPTER X

### SUMMARY OF RECOMMENDATIONS

#### Chapter I

##### Preview

1. All the labour laws, to the extent applicable to the Railways, should be collated into single a booklet for the guidance of railway personnel.

(Para 3.5)

2. Railways should set up adequate machinery to discharge their obligations under various labour laws. This is particularly necessary for contract labour.

(Para 4.2)

3. While wage patterns should continue to conform to those applicable to Central Government employees, the Railways should be able to fix wages for non-cadred and temporary staff having regard to market forces.

(Para 5.2)

#### Chapter II

##### Manpower Planning

4. To get full productivity from modernisation, a proper manpower plan should be framed and continually updated in response to investment planning, and the profile of modernisation and growth.

(Para 1.5)

5. The manpower plan should take into account the additional activities the Railways propose to enter, those that are to be meaned out, and a quantification of staff redundancies through mechanisation, modernisation and rationalisation etc. A time schedule and the period of gestation in regard to recruitment of officers and staff should be delineated and worked into the plan.

(Para 1.6)

6. The Manpower Planning Cell of the Railway Board should be effectively revived, since it is only at the Board's level that an appreciation of the longer term adjustments in staff levels, and the changing profile of their needed qualifications can be anticipated.

(Para 1.7)

7. Each Zonal Railway Headquarters should have an adequately manned wing for detailed manpower planning. This wing should deal with manpower planning, recruitment and training. It should monitor implementation in the individual Workshops and Divisions, which should also have a similar cell reporting to the Senior Divisional Personnel Officer.

(Para 1.9)

8. Manpower Planning should also take into account the need for a good age profile of staff and recruitment adjusted for smooth transitions, instead of ragged and bunched patterns which come about through short-term perspectives. This would ease the problems of training. In the absence of such an approach, career prospects and motivation cannot be maintained.

(Para 2.2)

9. While financial correlation is important to test the choice of technology or systems, this should not be used in isolation as a determinant of manpower plans, since the Indian Railways are an expanding system and must be allowed to achieve physical targets.

(Paras 3.1 to 3.3)

#### Chapter III

##### Recruitment

10. Basic literacy should be prescribed in the recruitment standards for all staff irrespective of category. The minimum educational qualification should be eighth class for non-technical trades, and tenth class along with recognised trade training for the technical categories. These conditions should be equally applicable to casual labour.

(Paras 2.2 to 2.4 and 2.8)

11. Inspite of having had trade training, artisan staff should be initially recruited into Class IV and then promoted to artisan grades in a time bound programme, subject to passing trade tests. This will obviate the need to have a separate set of unskilled hands for whom there would be few promotion prospects, and help in developing the correct work ethos.

(Para 2.5)

12. The Railways should ease the administrative problems of Class IV recruitment, by handling this from limited lists submitted by local Employment Exchanges. They should, however, ensure that the wards of railwaymen, who are in transferable jobs, are not excluded from registration on account of any "sons of the soil" approach.

(Para 3.2)

13. Each Railway Service commission should have one Chairman and a whole-time Member. The Secretary should be the executive head, and not a Member of the Commission.

(Para 4.8)

14. For each selection, the Chairman or Member of the commission should sit in with two co-opted Members, one of whom should be a serving railway officer and the other from a local or neighbouring Central or State Government Office. Co-opted Members should be roughly equal in rank to the Service Commission Members to ensure objectivity. The co-opted Members should have full participatory status.

(Para 4.9)

15. The number of Railway Service Commissions should be reduced to nine, on the basis of one per zonal railway, and the concept of linguistic homogeneity discarded. The zone-wise distribution of Service Commissions would be both economical and administratively more effective.

(Para 4.10)

16. One Service Commission Headquarters should be set up as an Apex body, which should serve, *inter alia*,



as a Research, Analysis and Coordination wing, with the responsibility to update methodology of examinations, in consultation with various professional institutes, academies etc. It should also organise a single examination for such categories where graduation is prescribed, so as to preserve the all-India character of the Railways in higher grades. The Apex body should be the supervisory agency to monitor the activities of the Railway Service Commissions.

(Para 4.11)

17. In due course, the need to convert the Service Commission headquarters into a statutory body may be considered, based on experience.

(Para 4.13)

18. The Chairman of the Railway Service Commission should be a senior serving Railway officer, and the Members suitable officers, on deputation basis. The status and pay-scales of Chairman and Members of the Railway Service Commissions should be examined by the Ministry of Railways in order to ensure that they are given recognition in relation to their responsibilities.

(Para 4.15 & 4.16)

19. The Railways should set up a system of feedback to the Service Commissions to continually check the validity of selection procedures.

(Para 4.17)

20. The provision for induction of qualified people from the open market should be maintained, and in no category should this be prescribed at less than fifty percent. In general, the apprenticeship concept should be revived in all important categories of the Railways. This is specially important for Running Staff. The backlogs of qualified open market entries in Class III should be made good within three years. For this, serving Railway employees should be given opportunities to compete for quicker open market promotion channels, and the age limit for them increased to forty years.

(Para 5.5)

21. Recruitment process should be considered complete only when induction has been satisfactorily carried out. The proposed manpower cells should monitor the progress and formulate guidelines for recruits, their counselling, and placements in consultation with the controlling officers.

(Para 6.2)

22. Computer aids should be used to cut down recruitment time to a maximum of three to four months. Objective tests should be used as a screening process and these should be developed to also help evaluate personality traits. The Apex body should coordinate this in consultation with various specialised bodies. Interviews wherever required, should thus be limited to candidates three times the number of vacancies.

(Para 7.20)

23. Adequate academic qualifications should be prescribed for promotion of Class II officers to Class I. This should be made prospective from January, 1988.

(Para 8.2)

24. Officers with adequate electronics bias in their training could be recruited into S & T. This also of interest in Electrical and Mechanical Branches of the Railways.

(Para 10.2)

25. For the S & T officers, there should be one paper in the recruitment examination entirely devoted to advanced electronics. For the Electrical and Mechanical

Branches, one paper on electronics and control systems should be introduced.

(Para 10.4)

26. Railways should plan to build up sufficient expertise in the field of computers. For the time being, no separate cadre need be set up. The requirements of computer specialists should be met by additional recruitment into regular railway cadres and young officers with three to five years experience should be put through advanced courses on computer systems. In the initial stages, consultancy for specific projects should be obtained wherever necessary. The specially trained railway officers may work with such consultants. A System Analysis Group should be created on each zonal railway and placed under a Chief Systems Analyst in the rank of a Level Head of Department, for coordination and programme execution for all branches of the railways.

(Para 11.3)

27. For Mechanical Engineers, both streams of recruitment, viz., Special Class Apprentices and combined Engineering Services Examinations should continue. Special Class Apprentices should be attached for a short time, during the apprenticeship period, to an Engineering College or Institute of repute, for exposure to larger teaching faculties.

(Paras 12.2, 12.3 & 12.5)

## Chapter IV

### Training and Development—I.

28. The scheme of training should provide for four distinct aspects of in-service instruction. These are : (a) initial/induction; (b) career development or promotional; (c) refresher and (d) specialised training, for specific needs.

(Para 2.1)

29. The induction process should be formalised for all categories where initial training is not provided. This should consist of introduction to the Railways, familiarising the new recruit with basic rules and procedures including grievance machinery and personnel matters, an idea of channels of promotions, Discipline and Appeal Rules, as well as training for the actual job to the extent required.

(Para 3.2)

30. An induction booklet should be prepared and given to all new recruits. This should be a simple compendium of basic rules and regulations including welfare measures for the guidance of the new employee, and should be printed not only in English and Hindi, but in regional languages also.

(Paras 4.1 & 4.2)

31. During induction and initial training, the necessity of having good customer relations and a sense of pride and belonging to the organisation should be inculcated.

(Para 5.2)

32. The induction training should be handled largely by the supervisor at the workspot, who should follow up the new recruit during the initial stages. This will also help rehabilitate the status of the supervisor and the respect of those working under him.

(Para 6.2)

33. Promotional courses should be conducted in-house and should be prescribed at various stages where marked change of professional skills is required on



promotion. Career development courses, on the other hand, can avail of facilities available outside the Railways, and these should be freely used in order not to overburden an already inadequate training infrastructure. Ministry of Railways should study the levels at which various categories should compulsorily undergo promotional training.

(Paras 7.2, 7.3 & 7.5 to 7.7)

34. A deliberate plan should be evolved for Career Development Courses, in order that an individual acquires in-depth expertise. Each individual should continually be put through an increasingly advanced course in a limited field, rather than being seconded to a wide variety of courses when they become available.

(Paras 3.1 & 8.2)

35. The concept of Career Development Courses should be extended to senior supervisory staff also.

(Para 8.3)

36. Refresher courses should be made compulsory to be attended by each employee once every five years, unless he has done a promotional course in the intervening period. For safety categories these courses should be attended every three years. At present, facilities are inadequate and also under-utilised even when available. Failure of an employee to pass the refresher test should act as a disqualification.

(Paras 9.1 & 9.3)

37. Controlling officers must ensure that the staff nominated for training are invariably released. A column "Development of Subordinates" should be introduced in the Annual Performance Appraisal, where this aspect should be taken care of.

(Para 9.4)

38. An all-India training policy should be evolved which would adopt clear targets. This policy should also deal with :

- (a) determination of total training needs, worked out in ample details, of types, categories, class room and hostel accommodation, number of instructor etc. Shortfalls should be made good within a period of three to four years along with rationalisation of existing institutes;
- (b) Separation of annual training budgets, both of capital and revenue account, and establishment of need-based norms by proper analysis;
- (c) Re-casting of training schemes in order to make facilities available to the maximum extent as close as possible to the workspot of an employee; and
- (d) examination of Personnel policy in order to create a proper training culture and the creation of an adequate number of trainee reserve posts.

(Paras 11.1 & 11.2)

39. The Railway Board, Zonal Railway Headquarters and the Divisions and Workshops should have a training cell as part of the manpower wings of the Personnel Branch. This should be manned by experienced officers.

(Paras 12.1 & 12.2)

40. The Training Cells should take over the basic planning and piloting of investment on training facilities, so as to bring proper perspective, rationalisation and avoidance of unplanned mushroom growth.

(Para 12.3)

41. The Training Cell in the Railway Board should monitor training performance on the zonal railways and provide the long-term policy formulation for the zonal railways. It should also evaluate the budgetary support required. At the Divisional and Workshop levels, the monitoring of training should be on individual basis, while at the zonal level, training performance audit should be undertaken.

(Para 12.5)

42. In broad terms, the present training capacity in the country is adequate for about sixty per cent of the Railways' needs, but it is unbalanced and there is a wide variation between the categories and types of courses. Furthermore, hardly forty per cent of the available training facilities are, actually, being used. Both these aspects should be taken into account in evaluating further plans.

(Paras 13.1 & 13.5)

43. The scheme of training for each category should be clearly laid down and the existing facilities evaluated in order to draw up a good planning model.

(Para 13.3)

44. Two types of facilities should determine the basic framework of training on the Railways. They should be those with Divisional jurisdiction (Branch Schools) and those with zonal jurisdiction (Specialist Schools).

(Para 13.8)

45. The Branch Schools should deal with Class IV staff, artisan staff and non-supervisory categories. They should be located so that an employee is ordinarily able to attend the School without having to shift residence, i.e. by commuting daily. Whereas, generally, one such School per major discipline would be enough for each Division, on some Divisions, there may have to be more than one, and facilities shared with an adjoining Division.

(Para 14.5)

46. There should be four standard Branch Schools on every Division, one each dealing with Traffic and Office Systems, Rolling Stock, Electrical and Telecommunications, and Civil Engineering. In addition, Divisions having diesel and electric loco sheds, should have captive schools as are already in existence. Each of these schools should cater for certain categories irrespective of Department. For example, Carpenters of all Departments should be trained in the Civil Engineering Branch School, while Welders of all Departments may go to the Rolling Stock School. In this scheme, the ministerial staff, for whom at present there is no training facility, would also be covered.

(Paras 14.7 to 14.9)

47. Mobile Training Schools should be arranged in certain cases, if requirement of models and teaching aids are not very large.

(Para 15.1)

48. Specialist Schools, unlike the Branch Schools would require hostel accommodation.

(Para 16.1)

49. Expansion of the existing Specialist Schools such as the Zonal Traffic Schools, should take into account the administrative difficulties in having too high a capacity. As a general principle, no establishment should train more than 500 trainees at a time, and an instructor should not be required to handle more than thirty to forty trainees.

(Paras 16.3 & 16.5)



50. The expenditure on Training Schools should be looked upon as an essential operating expenditure.

(Para 16.6)

51. There should be three types of Specialist Schools on each Zonal Railway. These should be : (a) Zonal Traffic School to handle all traffic and commercial categories and running staff on non-technical aspects ; (b) Systems Training School to handle all mechanical, electrical and S & T supervisors and (c) Engineering and Administration Schools to handle senior categories of Civil Engineering, Stores and Accounts.

(Para 16.9)

52. Although all training establishments should be directly under the Personnel Branch, the Branch Officers and Heads of Departments should be intimately involved in ensuring that the course contents are maintained upto date and there is a regular system of inspection.

(Para 16.10)

53. The Railways should be prepared to spend about four to five per cent of the staff wage bill for training purposes. The capital expenditure to set up training facilities would be additional and on a need-base. It should not be related to any direct financial returns.

(Para 17.5)

## Chapter V

### Training and Development—II

54. The utilisation of capacity in the various Training Institutes is poor and training should, therefore, be taken more seriously.

(Paras 3.1 & 3.2)

5.5 To make up the gaps in the Officers Training scheme, it is necessary to have ; (a) One Training Establishment on the Railways purely as a Management Training Institute for training of officers for senior ranks. This Institute should be autonomous with a part-time Chairman. (b) IRISST/Secunderabad should be nominated not only for in-service training for officers of the S & T Branch, but as a Centralised training institute for electronics, computers and cybernetics for all Branches; (c) The Indian Railway Institute of Mechanical and Electrical Engineering, Jamalpur, should conduct basic and advanced courses for the Mechanical and Electrical Engineering Branches in all aspects of production, rolling stock engineering, diesel and electric traction and electrical and mechanical maintenance ; (d) A separate Institute should be set up for advanced courses on OHE design, electrification projects etc. ; (e) An Institution of Transport should be separately established for courses on transportation, marketing and metropolitan transport.

(Para 5.2 and Annexure A-5.2)

56. Some capital investment is essential and this should be provided taking a long-term view, instead of piece-meal inputs. Details will have to be worked out, based on feasibility of expansions. Courses for materials management indicated at IATT, Pune, to balance workload, may be included in the Management Institute, if necessary.

(Para 5.4 and Annexure A-5.2)

57. The location of the new Institutes should take into account the facilities required for the faculty as well as the visiting lectures.

(Paras 6.1 & 6.2)

58. Senior officers should be regularly exposed to courses.

(Para 6.4)

59. A proper interface should be arranged between the R & D perspective of the Railways and the Training Directorate of the Railway Board.

(Para 7.1)

60. The Director General, RDSO, should submit the requirement of persons to be brought into position in the near future on specialised technical subjects. The Railway Board should, then, pick up the requisite number of officers to undergo specialised, ad hoc training in India and abroad.

(Para 7.2)

61. The Railways should set aside some funds for advanced and doctoral programmes in Universities in subjects of interest to the organisation.

(Para 7.3)

62. Universities should be encouraged to offer some regular advanced courses on subjects such as vehicle design, traction and braking, transportation economics etc. which are of special interest to the Railways.

(Para 7.4)

63. About five per cent of the staff strength should be earmarked as a trainee reserve, as a broad average. Details for each category may be worked out, taking into account, the full coverage of training recommended by us.

(Para 8.2)

64. With the availability of a larger number of officers in each Department, officers should be released for training without replacements being required, for periods up to ninety days. The number of courses with duration beyond ninety days should, therefore, determine the requirement of trainee reserve posts in the officer category.

(Paras 8.3 to 8.5)

65. There should be a gap of three to four days between successive courses at the Training Institutes to enable the Instructors to prepare course material, interact with field managers etc. In the course of the year, there should be one or two longer breaks to enable the Instructors to attend symposia, workshops etc. Training capacity should, therefore, be based on the availability of Instructors for about ten months in a year.

(Paras 9.1 & 9.2)

66. Better persons should be attracted to the posts of Instructors and a greater status attached to them.

(Para 10.1)

67. Only outstanding persons should be chosen as Instructors and should be posted to Training Institutes on a three year tenure.

(Para 10.2)

68. The Principal of the Management Institute should be of a General Manager's rank and those of other Officers' Training Institutes should be of the rank of Chief Administrative Officers. The Chief Instructors should be officers of the rank of Level I Heads of Departments. In the Specialist Schools, for staff on the Zonal Railways, the Principal should be in the Junior Administrative Grade and Instructors in various officer grades, chosen from amongst those promoted from Class III.

(Para 10.2)



69. In-service courses should be as short and concentrated as possible, so as not to cause undue personal inconvenience. The proposed Directorate of Training should periodically carry out critical examination of syllabi and course composition for each programme.

(Para 11.1)

70. Refresher Courses should be oriented towards updating of knowledge and exposure to the finer aspects of practice.

(Paras 11.2 & 11.3)

71. Wherever possible well-prepared course material should be sent to the trainees in advance, so that the actual training period can be used for constructive dialogue and discussion.

(Para 11.4)

72. Greater reliance on audio-visual techniques and variety in instructional methods should be adopted. The psychology and perceptiveness of trainees vis-a-vis ergonomics should be given due consideration.

(Para 12.1)

73. Simulators and video programmes should be widely adopted, especially wherever a person is required to handle a job which involves making a variety of decisions with limited response time.

(Para 13.1)

74. Simulators should be immediately considered for training of drivers. If necessary, one simulator should be imported to begin with.

(Para 13.2)

75. To meet the problem of large scale redundancies that may arise from new technologies, an Expert Group should be set up. As a general principle, however, the Railways should not enter into the field of adult education, but should provide liberal incentives, and coordinate with the Ministry of Education for special, tailor-made programmes. Voluntary retirement should be made more attractive, including some concession in employment to children and wards of employees seeking early retirement.

(Para 15.4)

76. Facilities in various training establishments outside the Railways should be freely availed of, instead of the Railways trying to expand their own infrastructure for a limited period.

(Para 15.4)

## Chapter VI

### Industrial Relations and Trade Unions

77. Category-wise associations should not have a legitimate place in the Railways collective bargaining system, as they can lead to serious distortions in the Railways' structure.

(Paras 3.1 & 3.2)

78. Both the organised Unions and the Management should take a lesson from past mistakes to ensure that category-wise associations do not gain credibility.

(Paras 3.3 & 3.4)

79. A single Union is desirable on the Railways and for this, the initiative should come from labour itself.

(Para 4.2)

80. The norms for recognition of Trade Unions should be amended as follows :—

(a) There should be a stipulation that the Union/ Association represents all classes of railway employees; and

(b) Unions should have a membership of at least thirty per cent of the non-gazetted employees they seek to represent.

(Paras 4.3 & 4.4)

81. In addition to a Code of Conduct for Unions that the National Labour Conference is considering, a regulatory mechanism should be introduced to prevent dual membership of Trade Unions.

(Para 4.6)

82. The amendment to Payment of Wages Act permitting recovery of Union dues through wage bills should be made use of by the Railways in consultation with Labour.

(Para 4.6)

83. The internal structure of the Unions should be regulated to prevent mushrooming of Branches, since this negates the very purpose of healthy and responsible Union-Management relationships.

(Paras 5.1 to 5.3)

84. Unions should be permitted to have a Branch for every 5,000 workers on a Division, and the Office Bearers of each should not exceed five. The Branches should function purely for organisational matters and not have any facilities for negotiations. Office Bearers of the main Divisional Branches should be permitted to be away from work for a maximum of 4 days in a month.

(Para 5.4)

85. The effect of the Railways' performance on the economy is so critical that it is important to have a reasonable period of uninterrupted working of the Railways for a few years. The grievance machinery should be strengthened. Government should also consider extending the Essential Services Maintenance Act for another five years.

(Paras 6.6, 6.7 & 6.9)

86. There should be a continuity of Personnel Policy on the Railways to maintain the credibility of the Railway administration. Issues arising out of strikes and lockouts should be handled in accordance with the legal provisions and not on political considerations.

(Para 7.1)

87. Supervisors, as the first line of management, should not be permitted to be Members of Trade Unions. This should be applicable to all grades of Supervisors, commencing from the scale just beyond the first appointment grade.

(Paras 8.1 to 8.4)

88. Supervisors should be permitted to form an association on the lines of the Officers' Federation, with facilities to meet management both at Zonal Headquarters and the Railway Board levels.

(Para 8.5)

89. The Permanent Negotiating Machinery in the Railways should be abolished since it is a duplication of the arrangement of the Joint Consultative Machinery. Only the latter should be retained.

(Paras 11.6 & 11.7)



90. The Railways should, for the future, return to the concept of one-man Tribunals. This should be headed by an eminent serving or retired Member of the Judiciary.

(Para 12.2)

91. To bring down the time involved in payment of dues, which account for the bulk of grievances, all decisions should have a prospective effect only, and for the past period, there should be adhoc lump sum payments instead of individual calculations for each employee.

(Para 13.2)

92. Service records of staff should be kept up-to-date in order to cut down grievance handling time. This should be the special charge of the Personnel Branch and form part of the duties of Personnel Inspectors.

(Para 13.3)

93. The practice of bill checking by the Personnel Branch should be dispensed with and this transferred to the Accounts Branch.

(Para 13.4)

94. The work of the Personnel Department should be regularly audited and given attention by the Divisional Railway Managers to improve grievance handling.

(Para 13.5)

95. The Personnel Branch should be restructured to bring grievance handling directly under the executive officers.

(Para 13.6)

96. The procedures followed by the Personnel Branch should be scientifically studied and streamlined, based on industrial engineering principles.

(Para 13.8)

97. To prevent administrative action getting bogged down in courts of law, separate Administrative Tribunals should be set up for service matters, and these issues taken out of the purview of civil courts. A provision for appeal should lie only at the Supreme Court level.

(Para 14.1)

## Chapter VII

### Personnel Department : Role and Structure

98. Persons involved with Personnel Management should have adequate background, knowledge and also a feel of the organisational culture. This is necessary both at the higher and lower levels.

(Para 2.1)

99. There is urgent need to rehabilitate the Personnel Department by securing the services of younger and competent officers with a longer term exposure to help in evolution of right policies.

(Para 2.5)

100. The Indian Railway Personnel Service should be given a fair trial before any fundamental change in the staffing arrangement is considered.

(Para 3.3)

101. The Service prospects of IRPS officers should be worked out in detail.

(Para 3.3)

102. The percentage of entry into Class I IRPS, from Class II, should be the same as in other services.

(Para 3.4)

103. To assess the efficiency of the specialised IRPS cadre the bulk of the new recruits should be posted to two or three earmarked zones and the performance of these compared with the other zones, which have traditional staffing. The comparative assessment should be carried out by 1987.

(Para 3.5)

104. Probationers entering the IRPS should have sufficient exposure to railway functioning at the field level. The training of IRPS probationers should be supervised directly by an experienced officer.

(Paras 3.6 & 3.7)

105. Certain important real life issues should be included in the syllabi of IRPS probationers. They should *inter alia* be required to foot plate on locomotives, stay in running rooms, accompany Permanent Way Inspectors and conduct certain trade union negotiations.

(Para 3.7)

106. The Personnel and Welfare Inspector categories should be augmented which should result in the reduction of the ministerial staff in the Personnel Department.

(Para 4.1)

107. There should be increased reliance on mechanisation of office system, electronic data storage and retrieval and rationalisation of office procedures, accompanied by increased efficiency and shedding of a great deal of 'fat'.

(Para 4.2)

108. Posts of Personnel and Welfare Inspectors should be filled entirely by selection and made an essential channel before promotion of Class III staff in the gazetted cadres of the Personnel Branch. Twenty percent of the posts of Welfare and Personnel Inspectors should be reserved for supervisors of various Departments.

(Para 4.3)

109. A minimum tenure of three years in a Division or a Workshop should be stipulated for persons from the Railway Board Secretariat Service before they are inducted into the Indian Railway Personnel Service.

(Para 4.4)

110. All routine establishment matters should be brought under the executive officers who should be provided with Personnel Officers under them for this purpose. This should apply both at the Divisional and Zonal level.

(Paras 5.1 & 5.2)

111. All aspects dealing with transfers, promotions, rewards and punishments, career planning and service records, should be dealt with by the departmentalised units of the Personnel Department serving directly under the executive officers.

(Para 5.3)

112. In the Zonal Headquarter offices the Chief Personnel and Industrial Relations Officer should have five distinct wings under him, one each dealing with Industrial Relations, Manpower Planning-Recruitment-Training, Welfare, as well as routine Establishment Wings separately for officers and staff. The Industrial Relations Wing should have one portion dealing with Personnel Research as distinct from labour negotiations and consultative machinery.

(Para 5.4)



113. Personnel and Welfare Inspectors should have distinct functions which do not overlap. Personnel Inspectors should deal with grievances and issues arising out of service matters and should function under the executives. Welfare Inspectors should deal with genuine welfare activities and function in the Personnel Department.

(Paras 5.6 & 5.7)

114. Personnel Research Cells in the Zonal Headquarters should conduct system studies for improvement of personnel procedures.

(Para 6.2)

115. Personnel Officers, who would function under the executives as per our proposals, should be charged with responsibilities to follow up Performance Appraisals and provide counselling wherever required. They will also be the mainstay of the Grievance Machinery.

(Paras 6.3 to 6.8)

## Chapter VIII

### Promotion Policy and Career Planning

116. The Railways should have a well defined career plan for each category and this should be taken into account in the determination of recruitment levels, structure, and the pace of physical development.

(Para 1.2)

117. Staff recruited in to class IV and class III to the revised educational standards should all be able to get their first promotion in about four years time from the date of recruitment, subject to suitability. The average Class IV entry should be able to ultimately rise to the level of a supervisor, and the Class III entry up to the rank of a Senior Scale Officer.

(Para 2.2)

118. Categories such as peons, messengers, sweepers etc. for whom it is difficult to find suitable promotion channels, should be progressively reduced through mechanisation and better office procedures.

(Para 2.3)

119. The Career Plan should provide for a tenure of atleast five years at the highest level to provide full benefits both to the employee and the organisation.

(Para 2.3)

120. A system of Advanced Operators for artisan staff should be adopted in the production units, and elsewhere in very special cases. With this a highly skilled man may continue doing his operators job, although promoted, on the basis of seniority and experience to a supervisory grade of pay.

(Para 3.3)

121. An accelerated channel of promotion should be provided for really outstanding persons to enable them to rise quicker and to a higher ultimate level than their colleagues.

(Para 2.3)

122. With progressive modernisation the percentage of Class IV staff to the overall non-gazetted staff strength should be brought down to about twenty per cent. This should not be through upgradations, but by actually using the proportionate increase in Class III staff for direct work.

(Para 2.4)

123. The Supervisor to staff ratio should be kept at about 1:5, averaged over the system. At the field level, the supervised gang may consist of seven or eight persons.

(Para 2.4)

124. A five yearly cadre review should be done to iron out distortions that take place, owing to uneven expansions, in determining the percentage distribution of Class III staff in various grades.

(Para 2.4)

125. The promotion prospects of Railway Officers are poor and this results in a number of probationers and experienced officers resigning from service. Cadre reviews should be carried out every three years in accordance with an already existing Government decision.

(Paras 3.2 & 3.3)

126. The distortion arising out of the last cadre review whereby a Coordinating Head of Department writes the confidential report of his colleagues in the same grade, should be rectified. A genuine head of each discipline on the Zonal Railways should be restored.

(Para 3.4)

127. Recruitment of Class I officers should be phased out even when an expansion is foreseen, and should have a relation with the cadre structure. The recruitment levels of the past three years are far too high.

(Paras 4.1 to 4.6)

128. The time schedule for promotions beyond Junior Administrative grade are extremely high, for all further grades. This should be brought down. A senior officer should be specially deputed to undertake the cadre review which has become due, and take into account all relevant features including structural requirements.

(Para 5.3)

129. The percentage of senior officers on deputation should be increased. There is a double benefit in doing so because of the good experience available in Railways in many fields, as well as widening of exposure to Railway officers themselves.

(Para 5.4)

130. The present promotion policy of alternating suitability and selection tests for Class III should be dispensed with, since they do not either throw up really meritorious individuals, or generate a sense of confidence among the staff.

(Paras 6.3, 6.4, 6.6 & 6.7)

131. 75 per cent of the vacancies at each promotion for non-gazetted staff should be filled in on the basis of seniority-cum-suitability, while the remaining 25 per cent should be a pure selection, unrelated to seniority, and all persons in the immediately lower grade made eligible for selection.

(Para 6.8)

132. To bring greater confidence among staff, selection tests should be on a confidential system with roll numbers.

(Para 6.12)

133. For officers, the existing system of giving overwhelming weightage to seniority for promotion should be dispensed with. Proper weightage for merit should be given at all promotional levels.

(Para 7.6)



134. The Railways should adopt numerical grading for each attribute in the Performance Appraisal, on a Ten Point Scale. This can be reduced to a Five Point Scale for officers above Selection Grade.

(Para 8.6)

135. Annual performance appraisals should be discussed between the reviewing officer and the Personnel Officer attached to the executive. For officers there should be a discussion between the Head of the Department and the Chief Personnel Officer.

(Para 8.8)

136. The formats for performance appraisals should be modified to include

- (a) Whether the person takes interest in the longer term objectives of organisation or is he largely concerned with routine work.
- (b) "Development of subordinates" This should specially cover interest taken in training.
- (c) The type of work for which the person is most suited.
- (d) A separate cut away portion with recommendations about training courses suggested.

(Para 8.10)

137. Self appraisal should be introduced for those involved in R and D work.

(Para 8.12)

138. The reports should continue to be confidential but there should be increased use of counselling.

(Para 8.13)

139. A minimum experience criterion should be laid down for each promotion, which should be equally applicable to all employees irrespective of whether they are on the reserved list or not.

(Para 9.14)

140. The system of promotion on trial from amongst the best of failures should be discontinued.

(Para 9.14)

141. The Zone of consideration for promotion should be the same for all employees, viz, the immediate grade below.

(Para 9.14)

142. The reservation policy should not be applicable to any category which affects safety directly or indirectly.

(Para 9.14)

143. There should be a proper delineation of categories of staff who are involved with train safety, through an analysis of past accidents attributed to human error.

(Para 9.14)

## Chapter IX

### Morale and Motivation

144. Deliberate effort should be made to disseminate information to every employee concerning his status with regard to important features such as housing, promotion, confirmation, educational assistance, loans and advances, holiday home accommodation etc.

(Para 2.5)

145. Seniority lists should be put up on notice boards at regular intervals, and at least once a year.

(Paras 2.7)

146. Rules should be rationalised so that a common policy is applicable to all staff under one unit of administration. The distinction between pooled and non-pooled accommodation particularly needs attention.

(Paras 2.8 & 2.9)

147. All Zonal railways and Divisional Headquarters should create a cell of Personnel Circulars purely for reference.

(Para 2.10)

148. There should be an annual summary of all orders issued during the year with suitable indexing. Manuals and Codes should be reprinted every five years, and the earlier ones withdrawn from circulation.

(Para 2.11)

149. Once in every three months there should be visits of Personnel and Welfare Inspectors to road-side stations to establish communication with the lowest levels of the organisation.

(Para 2.12)

150. Employee's complaints and representations should be invariably acknowledged. Personnel Inspectors should be specifically charged with communicating to the employees the correct position.

(Paras 2.14 & 2.15)

151. Personnel Inspectors should ensure that entries in the service records are not allowed to become more than one month behind the current position.

(Para 2.16)

152. A system of Briefing Group should be adopted whereby senior subordinates should be briefed on policy matters and given responsibilities to disseminate information.

(Paras 2.17 & 2.18)

153. The Productivity Linked Bonus should be based on Traffic Tonne kilometers per employee (excluding staff in the production units).

(Para 3.5)

154. In case of difficulties in implementing the concept of transportation per employee at short notice the base year for payment of bonus should be altered 1981-82, in the interim.

(Para 3.6)

155. There should be a phased change on formula for bonus payment by relating it to Zonal, and later Divisional performance, instead of a single All Railway figure.

(Paras 3.7 & 3.8)

156. Healthy local competitions may be set up to achieve targets but there should be very little financial reward for such achievement. This should be more oriented towards bringing about a sense of participation and mutual understanding.

(Para 3.11)

157. Momentos such as wrist watches transistor radios etc. should be given to persons with long records of good attendance, participation in voluntary work etc. This should also be given for operating staff who are not taken up under D & A action for prolonged periods.



action for prolonged periods. Citations and write ups should be regularly given in railway magazines and house journals. (Paras 4.3 & 4.4)

158. Schemes for recognition of merit should be continuously researched. (Para 4.5)

159. Staff should be encouraged to increasingly manage their own welfare schemes. (Para 5.3)

160. Avenues should be explored to raise funds to improve availability of housing through various financial institutions, the Group Insurance Scheme etc. (Para 5.6)

161. Some part of the Productivity Linked Bonus may be paid in the form of non-monetary benefits. (Para 5.8)

162. In all new projects, housing for staff should be incorporated in the estimates bearing in mind local conditions. (Para 5.9)

163. The limit of housing loans should be raised to Rs. 2.0 lakhs, and the ceiling for the total cost of construction withdrawn as a criterion. (Para 5.11)

164. A school to the scale of a Central School should be set up on each division and handed over to the Central School authorities, as and when possible. (Para 5.13)

165. These Schools should have hostel accommodation for wards of employees not posted in the same station. (Para 5.13)

166. Railways should give financial support to certain schools in major towns and cities in return for guaranteed admission of children of railway employees who are subject to transfer. (Para 5.14)

167. For officers an educational assistance scheme of the type in operation in the Defence Services may be adopted. This involves debiting each officer a

small amount every month and reimbursing at a higher level during the school going years of children. (Para 5.15)

168. Railways should set up some training schemes as a welfare measure to help wards of railway employees to improve their chances for recruitment to the Railways. (Paras 6.1 & 6.2)

169. Supervisors should be delegated some authority to take D & A action against lower staff, details have been given. (Para 7.1)

170. There should be a clear policy on tenures for officers, and all officers should take turns in the hardship postings. (Para 8.4)

171. Transfer allowance should be related to real costs incurred, and should cover costs of professional packing services, transport and labour. (Para 8.4)

172. Family transit accommodation should be provided, at all Divisional and Zonal headquarters, to persons awaiting house accommodation. (Para 8.4)

173. Rest house accommodation in the metropolitan cities should be increased to meet actual needs. Catering facilities should be provided at cost and transport reimbursements related to place of stay. (Paras 8.5 & 8.6)

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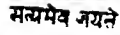
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**रेल मंत्रालय Ministry of Railways**

**OF**

## नन्त्रमन्त्र नयने

**AUGUST, 1983**





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## INTRODUCTION

Signalling on the Railways is integral to both safety and efficiency in operations, and is therefore, an essential requisite for the optimum utilisation of capacity.

A number of important committees have laid stress on this. For instance the Estimates Committee in their 33rd Report submitted in 1956 underlined the leeway that the Railways had still to cover in signalling improvements and the far-reaching consequences that these could bring about in the performance of the Railways.

While nothing much was done in implement these recommendations, the Accidents Enquiry Committee under Pandit Hariday Nath Kunzru in 1962-63 again reviewed the subject in the course of their investigations and were disappointed to find that the developments, in signalling continued to be archaic in conception devoid of boldness and perspicacity in planning and dilatory in execution.

Even during our deliberations, we have frequently observed that there has been no perceptible change in the ethos of the Indian Railways on the development of signalling and telecommunication.

Earlier in Part I of our Report we had emphasised that a large proportion of accidents on the Railways occur on account of human failure on the part of those engaged in train operation. Signalling devices provide to a large extent a positive check on such human fallibility. The Accidents Enquiry Committee under the Chairmanship of Justice N.N. Wanchoo had in their Report in 1963 stressed the role of signalling in the promotion of safety. The techniques of signalling have indeed advanced today to an extent that it is possible to eliminate the chance of fallibility of human element to a degree not conceived of a few decades ago.

Unfortunately, the Indian Railways have lagged far behind the other important Railways in the world, including a number of those in the developing countries, in the adoption of modern signalling devices and techniques. It was, therefore, essential for us to go into those areas of signalling which have a close bearing on safety, viz. track circuiting, automatic warning and stop system, hot box detectors, last vehicle check devices, hazard detectors and a number of others. We consider that the Railways would do well in going for the early adoption of such improved devices and practices, in order the range of safety is enlarged and efficiency in operations is stepped up.

The Railways are expected to witness a catapult increase in both passenger and freight traffic in the coming decades. Signalling would play a major role in optimising the utilisation of track and rolling stock for handling this large growth in traffic.

Our studies have also revealed that the bulk of the freight and passenger traffic would continue to move on a few 'arterial routes', which constitute only about one-fourth of the total railway network. These routes have witnessed a heavy traffic growth in the past and are

now working to near saturation. In future as well, these very routes are expected to witness a prolific growth in rail-borne traffic.

Against this background we have suggested complete modernisation of the signalling systems on the arterial routes. Our recommendations include provision of multiaspect signalling, automatic signalling, panel interlocking/route relay inter-locking, centralised traffic control, cab signalling and mechanisation of yards.

A time-bound implementation, inter alia, of these recommendations would enable the Railways of successfully handle the quantum jump in traffic expected to materialise during the Eighties and Nineties.

We would invite a reference to the confusion in the system of maintenance practices of rolling stock that we have discussed in Part of our Report on 'Production and Maintenance of Rolling Stock.' As regards the maintenance devices and practices relating to signaling assets and equipment, we have noticed almost a similar confusion in such arrangements bordering almost on neglect.

It is, therefore, no wonder that such inadequacy of maintenance should result in a very large number of signal and interlocking failures, the official statistics of which in our view have been understated.

We have made a number of recommendations for bringing about a forthright improvement in the standard of maintenance devices and practices relating of signalling assets and equipment, and we would urge that the Railways implement these recommendations with urgency and seriousness.

Telecommunication is an essential input for operating a rail transport system. It has the same significance for a rail network as the nerve system has for the human body. For efficient and safe operation, the reliability in the performance of telecom. facilities has, therefore, to be as near to hundred percent as possible.

The Railways have, however, traditionally depended for their telecom. circuits on the overhead line wires provided by the Posts and Telegraphs Department. The experience with this arrangement has not been happy: efficiency of these circuits has been low and the delays in attending to failures abnormal. To overcome this problem, the Railways have appropriately started a programme of taking over the ownership, operation and maintenance of the overhead line wires exclusively dedicated to their use.

In the wake of heavy, growth in traffic from the Fifties, the Railways also developed a modest microwave network for providing 'point-to-point' telephone/teleprinter circuits and 'radio patch' facilities for control block circuits, provided by the overhead line wires. In view of the proposed computerisation of freight and passenger reservation systems, this microwave network will require to be revamped. In the interest of uniform control and command, the microwave network



would have to continue to be owned, operated and maintained by the Railways themselves.

On the electrified routes, the Railways have provided underground cables for block and control circuits. These underground cables, apart from having only a limited number of circuits, are prone to heavy 'induction' from the 25 KV AC equipment/thyristor-equipped locos.

We have accordingly recommended that on the heavy-density arterial routes the Railways should gradually switch over to radio-relay system in place of the underground cables.

During our studies and investigations we came across a conclusion reached by the World Bank in one of their Appraisal Reports in April 1980, in which they had

said that if there was an option between a number of diesel/electric locomotives and the introduction of modern telecommunication network on a major trunk route, the Railways should unhesitatingly opt for the latter in the interest of cascading growth in the efficiency of the Railways. The philosophy behind this conclusion is sound.

It is in the background of such an awareness that we have viewed with concern the niggardliness in the development of signalling and telecommunication facilities on the Railways.

We have, therefore, recommended that there ought to be during the coming years a serious enhancement in the allocation of resources, together with a transformation of outlook in the matter of development of signalling and telecommunication.



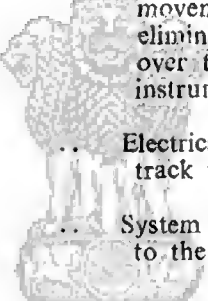


## GLOSSARY OF TECHNICAL TERMS USED IN THE REPORT

### SIGNALLING

1. AUTOMATIC BLOCK SIGNALLING .. A system of block working on double line in which signals are cleared automatically for the passage of a train after maintaining a specified distance behind preceeding train.
2. AUTOMATIC PREMISSIVE BLOCK (APB) .. A system of block working similar to Item 1 above but for use on single line. In this the direction of traffic is established manually.
3. AUTOMATIC WARNING SYSTEM (AWS) .. A system of giving visual and audible warning to the driver regarding aspect of the stop signal ahead and automatic application of brakes in case driver fails to acknowledge the warning within a specified time.
4. AXLE COUNTER .. A device for counting in and counting out the number of axles of the train at the entrance and exit of a section respectively. This can be used for proving the section clear of the presence of a train
5. BLOCK HUT .. A complement of signals operated from a small cabin provided to split a long length of block section between two block stations so as to increase the line capacity of the section.
6. CAB SIGNALLING .. A system of giving visual indications in the driver's cab of the aspect of signal being approached.
7. CENTRALISED TRAFFIC CONTROL (CTC) .. A system in which all points and signals at several stations over a length of railway line are operated from a central panel by the controller who is guided by visual indications on his panel.
8. CONTROL MANUAL BLOCK .. A system of working trains on single line by means of co-operative manual control by the Station Masters at either ends with the help of miniature levers.
9. DOUBLE LINE LOCK & BLOCK INSTRUMENT. .. Instrument used for train working on double line with interlocking with relevant signals.
10. HOT BOX DETECTOR .. A device fitted near the track for detecting hot axles on running trains.
11. INTERMEDIATE BLOCK SIGNALLING (IBS) .. The system of splitting of a block section by means of remote controlled signals located in between two block stations.
12. LINE CAPACITY .. Capacity of the section for running trains. This is specified as number of trains each way in 24 hours.
13. MECHANISATION OF HUMP YARD .. Operation of points and retarders in a marshalling hump yard from a centralised panel.
14. MULTI ASPECT SIGNALLING .. Signalling in which every stop signal is preceded by a pre-warning signal. This may involve three or more aspects.
15. MULTI ASPECT COLOUR LIGHT SIGNALLING (MACLS). .. Multi aspect signalling using colour light indications
16. MULTI ASPECT UPPER QUARDANT SIGNALLING (MAUQ) .. Multi aspect signalling using semaphore signals in the quardant.
17. PANEL INTERLOCKING .. System of operation of points and signals electrically from a central panel by operation of buttons/switches.



18. ROUTE RELAY INTERLOCKING (RRI) .. System of operation of points and signals electrically from a central panel in which a complete route is set by operation of single/pair of buttons on the panel.
  19. RETARDERS .. Braking devices fitted on the track for braking wagons being marshalled from a hump into classification lines
  20. SIGNAL
    - (i) DISTANT SIGNAL .. The first permissive signal at a station.
    - (ii) SECOND APPROACH SIGNAL .. Additional distant signal which is placed 1 Km. in advance of the normal distant signal of a station.
    - (iii) HOME SIGNAL .. Stop signal protecting the entrance points at a station.
    - (iv) STARTER SIGNAL .. Stop signal indicating the stopping place on a reception line. It is the signal which has to be taken off before a train can be started.
    - (v) ADVANCE STARTER SIGNAL .. The last stop signal at a station controlling entry into the block section.
    - (vi) OUTER SIGNAL .. The first stop signal at a station in 2 aspect signalling.
    - (vii) WARNER SIGNAL .. The signal which indicates whether the train has to run through a station or not.
  21. TOKENLESS BLOCK INSTRUMENT .. Block Instrument used for single line which controls movement of trains by inter-locking with signals, and eliminates the use of line clear token/ball which is handed over to the driver as his authority in case of token instrument.
  22. TRACK CIRCUIT .. Electrical circuit provided on a section of railway track to detect the presence of a train or a vehicle.
  23. TRAIN DESCRIBER .. System of displaying visual indication of train number to the cabinman/controller for identification of trains.
-   
TELECOMMUNICATION
24. AUTOMATIC TELEPHONE EXCHANGE .. Telephone Exchange in which local connections are established directly by diralling i.e. without the help of telephone operator.
  25. ALUMINIUM COVERED STEEL REINFORCED (ACSR). A type of wire with inner core of steel covered by aluminium conductors. This is used as a substitute for avoiding theft of copper wires on overhead line wire alignments.
  26. CONTROL CIRCUIT .. An omnibus circuit of telephones connected at different places which can be rung selectively by its controller from a central location. There are various types of control circuits such as section control, deputy control, traction power control etc.
  27. DUPLEX OPERATION .. A system of wireless communication in which both the parties can talk and hear simultaneously.
  28. TRAIN RADIO COMMUNICATION .. A system of communication between the driver/guard of a moving train with fixed points outside such as the control office.
  29. FACSIMILE System of transmission of tables pictures, diagrams, etc., electrically by line or wireless communication.
  30. LIGHT EMITTING DIODE (LED) .. A diode type visual indicator used instead of conventional filament type indication lamps due to its long life.
  31. MICROWAVE (MW) .. Wireless communication using frequencies in the range of 3 GHz to 30 GHz.



32. **ULTRA HIGH FREQUENCY (UHF)** .. Wireless communication using frequencies in the range of 300 MHz to 3 GHz.
33. **VERY HIGH FREQUENCY (VHF)** .. Wireless communication using frequencies in the range of 30 MHz to 300 MHz.
34. **OMNIBUS CIRCUIT** .. A telecommunication circuit from which telephone connections are provided at several stations or points along its route.
35. **PAGING & TALKBACK** .. Communication system in which loudspeakers are used for giving instructions from a central place to staff spread over an area and talk-back points are provided at various locations to enable the staff to talk with the central location.
36. **SUBSCRIBER TRUNK DIALLING (STD)** .. Trunk telephone service in which a telephone holder at one station can directly dial the telephone holder at another station without intervention of the telephone operator.
37. **TELEX** .. A teleprinter exchange through which connections between teleprinter subscribers at different places are established by direct dialling.







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## CHAPTER I

### SIGNALLING—AN OVERVIEW

#### 1.0. Introduction

1.1. Signalling promotes safety in train operations. It is an essential means for optimising the usage of track capacity. Over the years, signalling systems have been developed to suit the needs of growing train speeds and traffic density. Advanced Railways abroad have made increasing use of these systems not only for handling greater volume of traffic, but also for achieving higher safety standards. On the Indian Railways, modern signalling systems have so far been provided only to a limited extent.

1.2. In the coming decades, the Railways are expected to witness a phenomenal growth in traffic. Projections made by us indicate that by 2000 AD, the rail-borne freight and passenger traffic would rise to 2 to 2½ times of the present levels. The quantum of goods traffic would lie somewhere between 374 and 413 billion net tonne kilometres\*. As regards passenger traffic, the suburban and non-suburban passenger kilometres are expected to go up to 280 and 160 billions respectively.\*\* The Railways would, therefore, have to frame a long-term strategy for utilising modern signalling techniques to handle this prolific increase in traffic.

#### 2.0. Types of Signalling

2.1. Following types of signalling are presently in use on the Indian Railway :

1. Two-aspect lower quadrant signalling (LQ).
2. Multi-aspect upper quadrant signalling (MAUQ).
3. Multi-aspect colour light signalling (MACL).

2.2. *Two-aspect lower quadrant signalling* This was the earliest type of signalling introduced on the Railways and employed mechanically operated 'semaphore' signals of 'lower quadrant two-aspect' type. Till the beginning of the Fifties, bulk of the sections had this type of signalling. The main drawback of this type is that the 'stop signals' are not 'prewarned' by signals in the rear, with the result that possibility of a driver overshooting a signal 'at danger' exists. To guard such a possibility, train drivers, while approaching a station, have to reduce speeds of their trains, thereby adversely affecting the line capacity of the section. This type of signalling has, therefore, been found unsuitable for sections having a large number of trains running at high speeds.

2.3. The above shortcoming is partially overcome in a modified version of this type of signalling, known as 'modified lower quadrant signalling (MLQ)'. But even this version does not provide advance indication to the driver whether his train is going to be stopped at the 'home signal, or is being received on a 'loop line'.

2.4. *Multi-aspect Signalling*.—In view of the inherent shortcomings of the two-aspect signalling, the Railways have been pursuing a policy of replacement, in a phased

manner, of this type of signalling on the trunk routes and main lines, by multi-aspect signalling. Two types of multi-aspect signalling have been used : 'multi-aspect upper quadrant signalling' and 'multi-aspect colour light signalling'.

2.5. *Multi-aspect upper quadrant signalling*.—This type of signalling uses mechanically operated semaphore signals, but these signals are capable of displaying three aspects instead of two (as in the case of lower quadrant signalling). Further, in this type of signalling, a separate 'distant signal' is provided, which not only repeats the aspect of home signal ahead, but also gives indication to the driver as to whether he is going to be received on the main line or a loop line and whether he is going to be stopped at the home signal itself. Multi-aspect upper quadrant signalling is thus free from the deficiencies inherent in the two-aspect lower quadrant or modified lower quadrant signalling. As on 31 March 1982, multi-aspect upper quadrant signalling has been provided on 1,450 stations on the various routes of the Railways.

2.6. *Multi-aspect colour light signalling*.—This type of signalling uses electrically lit colour light signals in place of mechanically operated semaphore signals. Colour light signals, with their powerful and penetrating light, provide better visibility and drivers are able to sight them from far away and act upon their indications. This type of signalling thus ensures better identification of signal aspects, even under adverse weather conditions, and thereby provides increased safety in train operations. Further, colour light signals are not only free from problems like 'drooping signals, necessity of periodical wire adjustments, wear and tear of moving parts etc., which are inherent in semaphore signals, but also have the capability of displaying four or more signal aspects, thereby serving as a better aid to line capacity.

2.7. In view of these distinct advantages, the Railways have taken up a policy of providing colour light signals on the trunk routes along with their electrification as also on such of the non-electrified trunk routes and main lines as have a reliable power supply. By 31 March 1982, 1079, stations have been provided with colour light signals.

#### 3.0. Interlocking

3.1. To guard against the possibility of conflicting train movements, it is a universal practice to interlock signals with 'points'. This interlocking is achieved either through mechanical or electrical means and helps to ensure that before a signal is taken 'off', the route which this signal controls, is not only properly set and locked but that it also remains in this state till the passage of the train is complete.

3.2. Depending upon maximum permissible speed on the sections, three standards of interlocking are presently in use on the Railways, viz. (i) Standard I for speeds upto 50 kmph. (ii) Standard II for speeds upto 75 kmph, and (iii) Standard III for unrestricted

\* Cf. Paragraph 10.5 of Chapter I of Part II of our Report on TRANSPORTATION.

\*\* Cf. Paragraphs 5.3 and 6.8 of Chapter I of Part II of our Report on TRANSPORTATION.



speeds. By 31st March 1982, out of 6,197 block stations, 4,880 had been interlocked\*: 3,198 to Standard III, 41 to Standard II and 1,641 to Standard I. Of the remaining block stations, 858 were 'rudimentary' interlocked, 296 had no interlocking between points and signals, and the balance 163 were 'block huts'.\*\*

3.3. Including rudimentary interlocking, out of 6,197 block stations, 5,778 (92.6%) had been provided with interlocking by 31 March 1982. Since interlocking has a vital bearing on safety, we have dealt with this subject in detail in the next chapter.

#### 4.0. System of train working.

4.1. System of train working mainly used on the Indian Railways is known as 'block system'. This system is based on the principle of maintaining a fixed minimum 'space interval' between two trains on a section. This is achieved by providing signals and signalling equipment at the stations. In the earlier days, Morse telegraph instruments were used for exchanging messages about arrival and departure of trains, between the station masters at either end of a 'block section'. Since, in the use of these instruments, safety of trains depended on a rigid compliance of rules by the station masters, possibility of accidents occurring due to lapses in the observance of rules, by these officials, could not be precluded. This deficiency was later overcome, to a large extent, by the use of 'block instruments' in place of the Morse telegraph instruments. The block instruments give a continuous indication of the state of occupancy or otherwise of the line between two adjacent stations, which was not possible with Morse telegraph instruments. Thus they help in preventing more than one train from occupying the block section at one and the same time.

4.2. By 31st March 1982, use of block instruments for train working had been introduced on all sections on the Railways except 243 block sections on branch lines which had very light traffic and low speeds, with only a couple of trains each way in 24 hours. Out of these 243 block sections, 182 were worked on 'paper-line' clear, and 61 on 'one engine only' system respectively.

#### 5.0. Modern Signalling Systems.

5.1. The Estimates Committee of Parliament, in their 33rd Report, submitted in 1956, had stated that there was vast scope for improvement in the working of the Indian Railways by introduction of modern methods of signalling and interlocking.† Seven years later, the Kunzro Accidents Enquiry Committee, while reviewing this subject, had regretted that provision of signalling facilities on the Railways continued to be archaic in conception, lacked boldness in planning and was halting in execution.†† As discussed by us in a subsequent Chapter, things have not changed much.

5.2. Till the Sixties, signals and points at most of the stations were mechanically operated from two cabins, located at either end of a station, or from a single cabin in the middle. This mode of operation was necessary because of the availability in the country of only mechanical signalling equipment, with which points and signal could be operated up to a limited distance only. However, in the Sixties, indigenous industries, manufacturing electrical signalling equipment, started coming up. With the use of electrical signalling equipment, there is no limit on the distance up to which points and signals can be operated from a centralised location. This led to the introduction of modern signalling systems such

as 'panel-interlocking', for wayside stations, 'route-relay-interlocking', for junction-stations terminals and 'Centralised Traffic Control', for sections of 100-200 kms. length.

5.3. *Panel-Interlocking.* In panel-interlocking, the operation of signals and points at stations is centralised and controlled from a panel installed in the station master's room. The main advantages of this system are : —

1. Increased line capacity, resulting from single authority control, i.e. of the station master, over operation of points and signals, thereby eliminating the need of coordination between a number of agencies viz. the two cabins and the station master.
2. Greater safety due to provision of electrical control over points and signals, elimination of 'drooping' signals etc.
3. Economy in staff due to elimination of cabins.

5.4. By 31st March 1982, panel-interlocking had been provided on 417 stations on the trunk routes and main lines. The extent of advantages which have accrued from panel-interlocking under Indian conditions and the policy that should be pursued by the Railways in regard to panel-interlocking, would be discussed by us in detail in a subsequent Chapter.

5.5. *Route Relay Interlocking.* At important junction stations and terminals, where a large number of trains are dealt with, control of movement is spread over a wide area and a large number of officials are associated with the movement of a train. Coordination between the various officials and cabins increased the possibility of 'human failures'. Such coordination is also time-consuming. Route relay interlocking, by replacing several cabins by single cabin, aims at abolition of dispersal of control among the various officials. Apart from substantial saving in staff, it also promotes safer and more efficient train operations. The central operator is able to direct movement of trains within an enlarged area by setting routes and operating the relevant signals.

5.6. As on 31st March, 1982, 98 stations have been provided with route relay interlocking. In the interest of efficiency of train operations as well as safety and economy, route relay interlocking would need to be provided at all important junction and terminal stations. We have discussed this subject in greater detail in a subsequent Chapter.

5.7. *Centralised Traffic Control (CTC).* A further step in the centralisation of train operations is the evolution of 'Centralised Traffic Control', in which control on movements over a whole section is centralised at one focal point. Here, the CTC controller or operator is the central figure to whom the position of various trains on the section controlled by him, is conveyed automatically and instantaneously on a large sized panel in front of him. He not only makes decisions in regard to the movement of trains from crossings, or precedences, or where to shunt a train and when, but also sets routes and clears signals as required.

5.8. CTC installation comprises a number of power-relay interlocking units, stretching over a 100 kms. or more, with their individual controls concentrated at the central control point. The electrical controls and relay interlockings are so designed that it is virtually impossible

\* Cf. Statement No. 9 (b) of the Indian Railways Annual Statistical Statements 1981-82.

\*\* A block hut is a 'C' class station meant for splitting up a long block section. No points are provided at such stations.

† Cf. Paragraph 59 of the 33rd Report of the Estimates Committee, submitted on 18 May, 1956.

†† Cf. Paragraph 126 of the Kunzro Railway Accidents Enquiry Committee Report, Part II (1963).



for the operator to set 'conflicting routes, which would endanger the safety of trains. In addition, an automatic train graph recorder records movement of trains, and should a driver pass a signal at danger, the graph enables a check to be made. The knowledge of this continuous watch is sufficient to keep the drivers vigilant.

5.9. So far, CTC has been provided on a aggregate of 339 kms. length on the following sections : (i) Gorakhpur-Chhapra section (179 kms.) on the North Eastern Railway, (ii) Bongaigaon-Changrari section (135 kms.) on the Northeast Frontier Railway, and (iii) -Madras Tambaram section (25 kms.) on the Southern Railway.

5.10. CTC is a very sophisticated system of signalling and a number of advantages such as increased line capacity, economy, safety, etc., have been claimed to accrue from this system. Whether this system of signalling is suitable for Indian conditions has been a subject matter of controversy among the Railway officials for quite some time. We will consider this subject in greater detail, in the light of experience gained, in a subsequent Chapter.

5.11. Besides panel-interlocking, route relay interlocking and CTC, a few more improved signalling systems have been introduced on the Railways. These include 'tokenless block system' which substantially cuts down the block working time on a single line section, 'intermediate block signalling' which helps in splitting up to long block section into smaller ones and 'automatic signalling' which enables sending of more than one train into a block section. We have dealt with all these systems in detail in Chapter III.

#### 6.0. Mechanisation of marshalling yards.

6.1. Detentions and damages to wagons in marshalling yards can be considerably reduced by mechanising humping operations in these yards i.e. by providing automatic route setting devices and automatically controlled retarders. By 31 March, 1982, out of 38 major marshalling yards having humps, mechanisation has been introduced in ten. Different systems have been adopted in different yards. In many of the cases, mechanisation is reported to have failed to yield the intended benefits. This has been due to various reasons, including a half-hearted approach in the introduction of mechanisation in these yards. In a later Chapter, we have dealt with this subject and have given our recommendations on the policy to be pursued in this regard.

#### 7.0. Maintenance of Signalling Equipment.

7.1. For ensuring that train operations do not suffer on account of failures of signals and other signalling equipment, it is essential that these are maintained to a high standard. Due to various reasons, maintenance of signalling equipment has, however, not been upto the mark. Signal failures not only have a bearing on safety but also result in loss of line capacity. We have, later in this Report, examined this subject in detail and given our recommendations on improving the standard of maintenance of signalling equipment.

#### 8.0. Future profile of signalling.

8.1. A predominant share of freight and passenger traffic is presently carried on the trunk routes, forming the sides and diagonals of the quadrilateral formed by the four metropolitan cities, and a few important main lines which put together constitute what we have called the 'arterial routes'.\* The profile of traffic projected by us also indicates that these very routes would continue to carry bulk of the freight and passenger traffic in future.

The strategy recommended by us for handling this traffic, *inter alia*, includes introduction of heavier freight trains and super-fast inter-city passenger trains. The Railways, therefore, have to considerably strengthen the signalling systems on these routes, with a view to optimise the utilisation of track and rolling stock.

8.2. With regard to the remaining main lines, increase in traffic would not be as prolific as on the above routes. Signalling system on these main lines would, therefore, not require to be as elaborate as in the case of the quadrilateral and important main line routes. On the branch lines where traffic density would continue to be 'light' and speeds 'low', no major inputs in signalling would be needed.

8.3. Our views on the requirements of signalling for different categories of routes are given in Chapter III.

#### 9.0. Conclusions.

9.1. In earlier stages, when traffic density was light and speeds low, the Railways went in for two-aspect lower quadrant signalling. Till the beginning of the Fifties, bulk of the sections were having this type of signalling.

9.2. Commencing from the Fifties, there was heavy increase in traffic density and speeds on the trunk routes and main lines. The two-aspect lower quadrant signalling was not able to cope with the needs of traffic on these routes. Consequently, the Railways started replacing this type of signalling by multi-aspect upper quadrant and multi-aspect colour light signalling on the trunk routes and main lines. By 31 March, 1982, out of a total 6,197 block stations, 2,529 (40.81 percent) stations, principally on the trunk routes and main lines, had been provided with multi-aspect signalling of the upper quadrant or colour light type.

9.3. To ensure safety in train operations, signals are interlocked with points. Including rudimentary interlocking, this facility has been provided on 92.6 percent of the stations by 31 March, 1982.

9.4. During the last two decades, the Railways have also gone in for modern signalling systems like panel interlocking, route relay interlocking, centralised traffic control, intermediate block signalling, automatic signalling etc.

9.5. To reduce detentions and damage to wagons in marshalling yards, humping operations have been mechanised in 10 out of the 38 major marshalling yards provided with humps.

9.6. Maintenance of signalling equipment on the Railways, has not been up to the mark. This is resulting in numerous signal failures which not only have a bearing on safety but also cause serious loss of line capacity.

9.7. Routes constituting the sides and diagonals of the quadrilateral, formed by the four metropolitan cities, and a few other important main lines carry bulk of the freight and passenger traffic. This position is not likely to alter materially in the next two decades. The Railways would, therefore, have to provide modern signalling systems on these routes to suit the 'very heavy' traffic density which they would carry.

9.8. On the remaining main lines, increase in traffic density would not be as prolific as on the above routes. Signalling systems on these main lines would, therefore, not require to be as elaborate as on the above routes.

9.9. On the branch lines where traffic density would continue to be 'light' and speeds comparatively 'low', no major signalling inputs would be needed.

\* These 'arterial routes' comprise the trunk routes, constituting the sides and diagonals of the quadrilateral formed by the four metropolitan cities besides the following main line routes:

Mughalsarai-Lucknow-Amritsar, Delhi-Bhatinda, Delhi-Ambala, Kazipet-Secunderabad, Allahabad-Katni-Itarsi-Bombay and Madras-Trivandrum.



## CHAPTER II

### SIGNALLING FOR SAFETY

#### 1.0. Introduction.

1.1. Majority of railway accidents occur on account of 'human failure' on the part of those engaged in train operations. Signalling devices provide, to a large measure, a check on such human failures. Commenting on the role of signalling in promoting safety, the Wanchoo Railway Accidents Enquiry Committee had observed: "The techniques of signalling have indeed advanced today to an extent that it is possible to eliminate the chance of fallibility of human element to a degree not conceived of a few decades ago".\*

1.2. The Railways are planning to handle the anticipated large increase in traffic in the coming decades by, *inter alia*, such means as increasing the speeds and trailing loads of freight trains and running a larger number of super-fast intercity passenger trains with a trailing load going upto 22 coaches. Against this background, the critical importance of modern signalling devices in train operations for achieving greater safety cannot be over-emphasised.

1.3. The Committee note that the signalling systems on the Railways had been reviewed with particular reference to safety, by the three Accidents Enquiry Committees, appointed by the Government in the last two decades. These Committees had given a number of useful recommendations for provision of safety devices such as track circuiting, interlocking, automatic warning and stop system, second approach signal for catering to increased braking distances, etc. To what extent these devices have already been provided on the Railways and what further steps should be taken to accelerate their provision, would be examined by us in this Chapter.

#### 2.0. Interlocking.

2.1. The Kunzru and Wanchoo Accidents Enquiry Committees had recommended that, as an immediate measure of safety, at least 'rudimentary' interlocking should be provided at all stations on the Broad Gauge and Metre Gauge Sections. We find that this recommendation has not yet been fully implemented. On 31 March, 1982, there were 23 non-interlocked stations on the Broad Gauge and 44 on the Metre Gauge, which had still to be provided with rudimentary interlocking.\*\*

2.2. The Railways had not planned for provision of rudimentary interlocking at these stations on the ground that they were located on sections which either were having very light traffic or low speeds or were being worked under 'one engine only' system. In this con-

text, the Sikri Committee had observed that even on such sections, possibility of a derailment at the 'points' could not be precluded, if the stations were non-interlocked, and had recommended provision of rudimentary interlocking at these stations also.† We endorse this recommendation of the Sikri Committee and reiterate the urgency of providing rudimentary interlocking at these remaining 67 stations also within next two years.

2.3. The Sikri Committee had recommended provision of rudimentary interlocking at all stations on the Narrow Gauge Sections also. On 31 March 1982, out of a total of 331 block stations on the Narrow Gauge, 229 were still non-interlocked. In this context we have, however, recommended, in our Report on TRANSPORTATION, closure†† of all Narrow Gauge lines except those serving hill stations and the Narrow Gauge system in Central India. We, therefore, recommend that rudimentary interlocking at Narrow Gauge stations should be provided only on such of the sections which would not be closed but also within two years.

#### 3.0 Track circuiting.

3.1. An analysis of train collisions, covering a period of six years, made by the Kunzru Committee in 1963, had revealed that 34 per cent of collisions on Broad Gauge and 42 per cent on Metre Gauge were caused due to reception of a train on a blocked line or by despatching it into a blocked Section. To avoid such train collisions, the Kunzru Committee had suggested‡ track circuiting of passenger lines at stations.

3.2. Six years later, in 1969, while reviewing the pace of introduction of track circuiting, the Wanchoo Committee found that the progress in this regard had been slow because the Railways had not addressed themselves to this task "with the necessary sense of urgency. They recommended that the Railways should step up the progress and aim at completing, within the next ten years, track circuiting of 'run-through' lines and other passenger lines at all stations on trunk routes and main lines as well as important junction-stations on branch lines.

3.3. The Wanchoo Committee had also noted that the Railways were providing track circuiting on run through lines at stations between 'fouling marks' only. While this partial track circuiting, no doubt, reduced dependence on the human element for ensuring clearance of the line between fouling marks, it did not guarantee that the line was also clear beyond the fouling marks. In the event of a train or a vehicle standing beyond the

\* Cf. Paragraph 313 of the Wanchoo Accidents Enquiry Committee Report, Part II (1969).

\*\* Statement No. 9 (b) of Annual Statistical Statements of the Indian Railways 1981-82.

† Cf. Paragraph 411 of the Sikri Railway Accidents Enquiry Committee Report, Part I (1979).

†† Cf. Paragraph 21.8 of Chapter II of Part II of our Report on

#### TRANSPORTATION.

§ Cf. Paragraph 127 of Part II of the Report of Kunzru Railway Accidents Enquiry (Committee) (1963).

‡ A track circuit is an electrical device which indicates the occupancy of a line so equipped, by a train or a vehicle. The electric circuitry also provides interlocking between the 'points' and the relevant signals and prevents the latter from being taken 'off', so long as the line is occupied.



fouling mark or an adjacent track, 'fouling' the reception line, the limited extent of track circuiting was unable to prevent a collision. The Wanchoo Committee had accordingly recommended\* extension of track circuiting on the portions of track between the fouling marks and the 'block section' limits also. This recommendation was later reiterated by the Sikri Committee.†

3.4. *Progress of track circuiting.*—While the Kunzru, Wanchoo and Sikri Committees had envisaged provisions of track circuiting on 'run-through' as well as other passenger lines at stations, the Railway Board mainly embarked on a programme of track circuiting of 'run-through' lines, between fouling marks, primarily on the trunk and main line routes. The progress achieved in this regard during the last two decades is given in Table 2.1.

Table 2.1

**Track circuiting on 'run-through lines' from FM to FM.**

<i>Position as on</i>				<i>No. of block stations covered</i>
31-3-1963	...	...	...	165
31-3-1968	...	...	...	543
31-3-1978	...	...	...	1,926
31-3-1980	...	...	...	2,157
31-3-1982	...	...	...	2,305

3.5. It would be seen that, by 31 March, 1982, out of a total of 6,197 block stations, track circuiting on 'run-through' lines between fouling marks had been provided on 2,305 (37.2%) stations only. Even if we consider stations located on trunk routes and main lines only, for which a higher priority had been assigned by the Wanchoo Committee, we find that out of 3,280†† such stations, only about 1,700 had been provided with track circuiting by 31 March, 1982.

3.6. With regard to provision of track circuiting on other passenger lines, and its further extension up to block section limits, the Railways have made no real headway. The progress in this regard is given in Table 2.2.

Table 2.2

**Track circuiting of (i) other passenger lines and (ii) from fouling marks to block section limits.**

<i>Position as on</i>		<i>No. of block stations provided with track circuiting on other passenger lines</i>	<i>No. of block stations provided with track circuiting from fouling marks to block section limits</i>
31-3-1978	...	15	150
31-3-1982	...	36	210

\* Cf. Paragraph 350 of the Wanchoo Railway Accidents Enquiry Committee Report, Part II (1969).

† Cf. Paragraph 306 of the Sikri Railway Accidents Enquiry Committee Report, Part II (1981).

†† Figure derived from data given in paragraph 379 of the Sikri Accidents Enquiry Committee Report, Part I (1979).

3.7 The progress of track circuiting has thus been most unsatisfactory. Even 'run-through' lines at all stations on the trunk routes and main lines have not been provided with this facility as yet. With regard to track circuiting of other passenger lines at stations, or its extension up to block section limits, a mere beginning has been made so far. Reasons given by the Railway Board for this tardy progress are paucity of funds and shortage of wooden sleepers.

3.8. *Funds.*—It has been estimated that the requirement of funds for completing track circuiting of 'run-through' and other passenger lines together with its extension up to block section limits, at all stations on trunk routes and main lines and at important junction-stations on branch lines, is of the order of Rs. 350 crores. As against this the Railway Board have been allotting, on an average, only about Rs. 4-5 crores per year. At this rate it would take about 75 years to complete the existing balance of track circuiting works on trunk routes and main lines. If escalation in the cost of track circuiting works, that is bound to take place during this period, is also taken into account, this time-frame would stretch even further. The need to appropriately increase funds for track circuiting works is, therefore, paramount.

3.9. In view of the intimate linkage of safety with track circuiting, we recommend that the Railways should complete, latest by 31 March, 1990, track circuiting of run-through and other passenger lines, together with its extension up to block section limits, at (i) all stations on trunk routes and main lines, and (ii) important junction-stations on branch lines. To achieve this target the Railways would have to substantially step up the pace of track circuiting works. Requirement of funds for such an accelerated track circuiting programme would be of the order of Rs. 60 crores per year. We recommend that the Railways should increase annual outlay for track circuiting works to this level.

3.10 We also note that at present track circuiting works are charged to Accidents, Compensation, Safety and Passenger Amenities Fund§ (ACSPF). Total annual appropriation to this Fund is presently of the order of Rs. 12 crores only. Since Rs. 60 crores are needed annually to undertake track circuiting programme of the magnitude suggested by us, 'ACSPF' cannot meet the requirement of track circuiting. This problem can, however, be overcome if track circuiting works are charged to 'Capital' instead of 'ACSPF' and we recommend that this be done. Since track circuiting works are essentially safety works and to justify them on the basis of adequate financial returns might not be possible, we further suggest that the normal rules of working out financial returns on works charged to 'Capital', should not be applied in the case of track circuiting works.

3.11 *Shortage of wooden sleepers.*—Wooden sleepers are procured by the Railways from the State Forest Departments. We have been informed that there is an element of reluctance on the part of the State Forest Departments to supply wooden sleepers to the Railways. This is largely due to the rather low prices offered by the latter for these sleepers. Whereas the issue of pricing

§ This Fund was created with effect from 1 April, 1974, and annual appropriations to this Fund are made from the receipts realised from a surcharge, levied on passenger traffic. This Fund is utilised for giving compensation to accident victims and for executing certain categories of safety and passenger amenities works, such as track circuiting, automatic warning and stop system, foot over bridge in yards, manning unmanned level crossings, etc.



must be settled by the Railway Board expeditiously, this measure alone might not help the Railways to get their full requirement of wooden sleepers on account of the general scarcity of wood, resulting from our dwindling forest resources. Shortage of wooden sleepers is, therefore, a problem with which the Railways would have to live with, in the years to come. The Railways would, therefore, have to find an alternative to the use of wooden sleepers for track circuiting works. One such alternative could be concrete sleepers.

3.12 We understand that for track circuiting works some of the Railway Systems abroad use concrete sleepers in lieu of wooden sleepers. On the Indian Railways, there has, however, been little progress in this regard, mainly due to the unsuitability of the design of concrete sleepers in use in our country. The Sikri Committee had noted that even the improved design of concrete sleepers, with composite liners, was cleared by the Railway Board for use in track circuiting works with reservations, on account of its inadequate electrical resistance and had suggested that the Railways should evolve a satisfactory design for 'unrestricted' use in track circuiting. No tangible headway seems to have been made in this regard so far. We recommend that the Railways should step up their efforts with a view to expeditiously evolve a suitable design of concrete sleepers for 'unrestricted' use for track circuiting. Thereafter, concrete sleepers should be used in a big way for track circuiting works.

3.13. With the D.C. track circuits, presently used on the Indian Railways, the maximum permissible length of track circuit is 450 metres.\* Whenever track circuit length exceeds this, two or more sets of D.C. track circuits are used. This limitation can be overcome by the use of audio-frequency or high voltage impulse track circuits, which permit much longer track circuit lengths and are less susceptible to change in ballast resistance. We, therefore, recommend that the Railways should adopt audio frequency or high voltage impulse track circuits wherever lengths of lines to be track circuited justify their use.

3.14. At locations where track circuit lengths are short, usually 2-3 rail lengths, as in the case of providing automatic reversers for starters, the Railways should go in for use of high frequency track circuits. High frequency track circuits do not require insulated joints and this feature makes their use extremely useful on lines provided with continuously welded rails.

3.15. *Axle counters.*—Axle counters\*\* are electronic devices employed for detecting presence of a vehicle on a defined length of railway track. Apart from their many other uses, axle counters are also utilised as a substitute for conventional track circuiting. When used for the latter purpose, they have the following advantages over conventional track circuiting:

- (1) At present-day costs, use of axle counters, in lieu of conventional track circuiting with wooden/concrete sleepers, is expected to be cheaper in all cases except when track circuit is only for two rail lengths.

- (2) Unlike conventional track circuiting, axle counters do not depend on the bulk use of wooden/concrete sleepers. They can thus be used in conjunction with metal sleepers which are existing on about 70 percent of the total track kilometrage in our country.
- (3) Axle counters do not generally† require any 'insulation joints' which are necessary in case of conventional track circuiting. Track circuit failures resulting from damages to insulation joints on account of 'creep' of track, etc., are, therefore, altogether absent in the case of axle counters.
- (4) Unlike conventional track circuiting, operation of axle counters is not influenced by the length of track to be monitored or by ballast resistance. This is a distinct advantage as continuous change in ballast resistance always poses serious problems in adjustment of equipment employed for conventional track circuiting.
- (5) Unlike conventional track circuiting, axle counters are immune to failures caused by flooding of tracks during the rainy season.

3.16. Some of the Railway Systems abroad, notably the Federal German Railways, have used axle counters extensively as a substitute for conventional track circuiting. In view of the above advantages, continuing shortage of wooden sleepers and the unsuitability of the existing design of concrete sleepers for 'unrestricted' use in track circuiting, the Railways would, at stations with reliable power supply, also have to use axle counters, in a big way, in lieu of conventional track circuiting.

3.17. The Railway Board had imported a few axle counters from Germany, in 1969 and installed them on the Eastern Railway for field trials. After some initial troubles, these axle counters were found to be giving satisfactory service. The German Firm, which has supplied these axle counters, was willing to collaborate for setting up facilities for their manufacture in India. The Department of Electronics in 1970, however, turned down this offer and wanted that an indigenous design for these devices should be developed within the country. The Railway Board accordingly directed the RDSO to initiate action for evolving an indigenous design.

3.18. The RDSO has recently developed a design for axle counters, in association with the IIT, Delhi. Axle counters manufactured as per this design, in two of the Railways Signalling Workshops, were reported to have given considerable troubles initially. We believe that the initial teething troubles have now been overcome and the indigenous product has been improved to give a satisfactory service.

3.19. For undertaking track circuiting programme of the magnitude recommended by us, the requirement of axle counters would be very heavy. Signalling workshops of the Railways are mainly meant for

\* This limit is in respect of 'shelf type' relays only. With 'plug-in type of relays' this length further reduces to 270 metres.

\*\* Two axle counters are installed, one at the entry and the other at the exit of the length of track to be monitored. These devices work on the principle of 'counting' the number of axles at the entrance point and de-counting them at the exit point of the track

length. If counting and de-counting are equal, the length of track in question is free of any vehicle.

† Insulation joints are, however, needed for providing 2 rail length 'trolley suppression track circuit' when axle counters are used for block working.



undertaking repair works and have a limited capacity for manufacturing signalling equipment. For manufacture of axle counters over and above the production capacity of the Railways own workshops, requisite capacity would, therefore, need to be developed in the well established industries producing electronic equipment, in the public/private sector.

3.20. Cost of installing axle counters is presently charged to ACSPPF. For the reasons already spelt out by us in paragraph 3.10, axle counters should also be charged to 'Capital'. In this case also, working out of financial returns on the investments should not be necessary.

#### 4.0. Signalling safety devices at stations.

4.1. The type of mechanical signalling provided in the earlier stages, had numerous shortcomings. Some of these have been :

1. Possibility of receiving a train on a line already occupied by a train or a vehicle.
2. Signals once taken 'off' for despatch of a train remained in that position even after the train had left the station limits, until they were restored to 'on' position by the station staff. On double line sections and on single line sections having tokenless working, This deficiency led to several cases in which the 'off' position of the starter signal was mistaken by the driver of a following train, who proceeded into the blocked section.
3. Slot\* once given from the farther cabin could be utilised by the nearer (reception end) cabin for receiving more than one train.
4. Absence of station master's control on the 'home signal' or 'last stop signal'. It sometimes becomes necessary for the station master, on observing a wagon with hot axle in a passing train to put back the 'advance starter' to 'on' position, before the train passes it. If signalling equipment at the station does not provide this facility, possibility of derailment of such a train in the block section, remains.

4.2. The Railways have tried to overcome the above shortcomings by incorporating requisite improvements in the old signalling equipment. Towards this end, the Railway Board have been issuing instructions, since the early Sixties, for provision of certain safety features in the signalling equipment. These instructions are mainly based on the recommendations, made from time to time by Commissioners of Railway Safety, after enquiries into various accidents, and are meant to reduce the extent of dependence on 'human element'. Some of these safety devices are listed below :

1. Provision of track circuiting on reception lines. (This has already been discussed in detail in paragraphs 3.1 to 3.14 ante).
2. Automatic replacement† of starters on double line sections as well as single line sections having tokenless system of working.

3. Provision of station master's control on the 'home signal' and 'last stop signal'.
4. Provision of 'one slot one train' and 'one slot one starter' facility to ensure that slot once given can be utilised for reception and despatch of one train only.
5. Interlocking of crank handles at stations provided with motor operated points, with relevant signals.
6. Interlocking of isolation points.

4.3. The Railways have mainly been providing the above safety features either along with replacement of signalling gears at stations as this became due, or as a part of major traffic facility works like Doublings, Gauge Conversions, Electrifications, etc. Provision of these safety features has not generally been taken up independently, on the ground that such a course would involve non-interlocked working at stations twice-once while providing these safety features independently and the second time while replacing signal gears when due, or carrying out major traffic facility works, if any, at these stations.

4.4. Such an approach has been adopted since non-interlocked working of a station dislocates normal train operations, thereby affecting punctuality. This approach has, however, resulted in slow progress in the provision of these essential safety features. Except for provision of station master's control over the 'home signal' and interlocking of isolation points, in respect of which the work has been completed, considerable leeway still remains to be covered in respect of the other safety devices. The progress in respect of the provision of the remaining safety devices is indicated in Table 2.3.

Table 2.3

Position of provision of safety devices at stations as on 31-3-1982.‡

Safety device	No. of stations already covered	No. of stations yet to be covered
1. Provision of SM's control on last stop signal.	2,500	819
2. Automatic replacement of starter on tokenless block sections.	738	17
3. Automatic replacement of starter on double line sections.	648	933
4. Provision of 'one slot one train' and 'one slot one starter'.	1,434	1,922
5. Interlocking of crank handle at stations provided with point operations by electric motor with relevant signal	414	245

\* Slot in an electrical arrangement which provides control over signals of more than one agency. In this arrangement, even though such signals are operated by one agency, they cannot be taken 'off' unless control is released by the other agency.

† Change from 'off' to 'ON' position.

‡ Cf. Railway Board's letter No. 81/W3/SG/RRC/1, dated 2 August 1983.



4.5. We appreciate the restraints in providing the above safety features as independent works. At the same time, in view of their vital bearing on safety, provision of these features should not be allowed to be carried at the present slow pace. The Railways would, therefore, have to find ways and means of completing provision of these safety features in the shortest possible time. Towards this end we recommend as under :

1. Provision of the safety features should be completed on a time-bound programme, not exceeding five years, if necessary by undertaking them as independent works. Higher priority should be assigned to trunk routes and main lines, having heavy traffic density.
2. At any station all these safety features should be provided in to and not piecemeal.
3. These safety features should form an essential part of all future signalling works. These should invariably be incorporated in all project estimates of Doubling, Conversion, Electrification, etc.

#### 5.0. Safety Devices at Level Crossings.

5.1. As on 31 March, 1982 there were 37,248\* level crossings\*\* on the Indian Railways, of which only 14,471 (38.85%) were manned. There have been numerous cases of serious accidents both at unmanned and manned level crossings. During 1981-82 alone, there were 51 and 33 such accidents respectively at the manned and unmanned level crossings, resulting in 112 deaths and serious injuries to 76 persons.

5.2. So far as unmanned level crossings are concerned, the final solution would appear to lie in manning them. The Railway Board have indeed been following such a policy for unmanned level crossings. Due to paucity of funds, the Railways have been able to man not more than 100-150 level crossings per year. Since the number of unmanned level crossings is very large, being 22,777, manning of these level crossings cannot be completed in the foreseeable future. During the intervening period, some means for ensuring safety for road users have to be provided. Towards this end we recommend installation of electronic hooters, actuated by approaching trains at unmanned level crossing. This facility would provide audio-warning of an approaching train to the road users. Installation of this device should, however, be limited to only such of the unmanned level crossings where adequate visibility is not available for road users or train drivers. Higher priority in this regard should be given to unmanned level crossings located on the trunk routes and main lines.

5.3. In regard to manned level crossings, the Railways have been providing following safety devices :

1. Interlocking of certain class of level crossing gates with signals.
2. Provision of telephonic communication between gatemen and the adjoining stations for 'Special' class and 'A' class level crossings at certain categories of 'B' and 'C' class level crossings.

3. Provision of warning bells actuated by approaching train, in addition to telephones, for 'Special' class and certain categories of 'A', 'B' and 'C' class level crossings.

5.4. The progress of installation of safety devices at manned level crossings, in terms of the above norms, is given in Table 2.4.

Table 2.4

Position of provision of safety devices for manning level crossings as on 31 March, 1982§.

Safety device	No. of level crossings already covered	No. of level crossings yet to be covered
1. Interlocking of level crossings with signals. (for level crossings within station limits).	3,234	1,834
2. Provision of telephones at level crossings in mid sections.	1,863	3,590
3. Provision of warning bell for level crossings in mid sections.	136	1,040

5.5. Whereas there is a need to modify these norms, progress of provision of safety devices even in terms of these norms, has not been satisfactory, specially in respect of 'B' and 'C' class level crossings. The main reason for this un-satisfactory progress, apart from the inadequacy of funds, appears to be frequent policy changes which have been taking place over the years, particularly on the issue of providing telephones and warning bells. The debate regarding the comparative merits of telephones over warning bells, operated by approaching trains, has been needlessly a long one. It would appear that policies have not been enunciated after a thorough consideration of the various merits and demerits of the issue, which should have been the case.

5.6. The latest policy directives issued by the Railway Board in respect of safety devices at manned level crossings are given in Annexure 1.2.1. These instructions require provision of telephones at 'Special' and 'A' class and only such of the 'B' and 'C' class level crossings which are either located on Rajdhani route/suburban sections, or have restricted visibility when located on other routes. We consider provision of reliable communication between gatemen at level crossings in the mid-section and the adjoining stations very necessary. Such communication can be provided either by a telephonic connection or by warning bells. The Wanchoo Committee had gone into this question and had observed that warning bells are prone to 'theft' or 'vandalism' and had favoured provision of telephones. We are in agreement with this view and recommend that telephonic connection should be provided for 'all' level crossings located in mid-sections and not only for certain categories as is the present practice. Further, in the interest of safety, we also recommend interlocking with signals of all level crossing gates where visibility for the train drivers is restricted.

\* This excludes about 4,456 cattle crossings.

\*\* Depending upon the importance of level crossings, which is determined in consultation with the State Governments/Local Authorities, and the density of road/rail traffic, level crossings

are classified into (i) Special Class, (ii) 'A' Class, (iii) 'B' Class, (iv) 'C' Class (manned), and (v) 'C' Class (unmanned).

§Cf. Railway Board's letter No. 81/W3/SG/RRC/1, dated 3 August, 1983.



5.7. The Railway Board should draw out and implement a time-bound programme, not exceeding five years, for providing the above safety devices at all manned level crossings. Higher priority should be accorded to level crossings located on the trunk routes and main lines.

#### 6.0. Braking Distances and Inter-Signal Distances.

6.1. Inter-signal distances have traditionally been provided on the basis of a braking distance of one kilometre. Pursuant to a recommendation made by the Kunzru Committee\* braking distance trials were conducted by the Railways for various speeds, loads, etc. On the basis of these trials it was found that on Broad Gauge, while the emergency braking distance of mail/express trains running at 96 km/h was one kilometre†, that of goods trains consisting of 70 fully loaded four-wheeler wagons, and running at a speed of 72 km/h varied between 1.3 and 1.4 kilometres‡.

6.2. The Railway Board catered to these longer braking distances by adopting the following measures :

1. On Broad Gauge sections, where maximum permissible speed was 100 km/h, two warning boards were provided in the rear of the first stop signal, one for passenger trains at a distance of one kilometre and the other for goods trains at a distance of 1.4 Kms.
2. On Broad Gauge sections having maximum permissible speed of 72 km/h (or 48 km/h where adequate visibility was not available) and on Metre Gauge sections, where maximum permissible speed was 48 km/h only, only one warning board to serve both passenger and goods trains was provided, at a distance of 960 metres in the rear of the first stop signal.

6.3. In the context of running Rajdhani Express on Howrah-Delhi route at a speed of 130 km/h, RDSO conducted further trials which showed emergency braking distance for this train to be 1.3 kms., on the level and 1.5 kms. on 1 in 200 down gradient. Similar trials for running of super-fast trains at 110 km/h on other routes also revealed that emergency braking distance for these trains exceeded one kilometre. As a consequence of these trials, the Railway Board decided to have, on the Delhi-Howrah route, only one warning board at a distance of 1.5 kms. in the rear of the first stop signal to serve both passenger and goods trains. On other routes also on which super-fast trains at 110 km/h were introduced, only one warning board to serve both goods and passenger trains was retained but it was located at a distance of 1.4 kms. in the rear of the first stop signal.

6.4. The question of re-siting of signals on high speed routes on the basis of braking distance trials was also examined by the Railway Board. Based on the existing speeds for passenger and goods trains, as also higher speeds contemplated in future, the Railway Board issued the following instructions in 1969-70 for re-siting of signals, on routes nominated for future maximum speeds of 160 km/h for passenger trains and 72 km/h or above for goods trains, for which emergency braking distances were not expected to be in excess of 1.5 kms.

1. In the case of two-aspect lower quadrant (LQ) signalling territories, 'B' Class stations should be converted into 'A' Class stations, where feasible, and the warner signal located at a point 1.5 kms. from the home signal. Where this was not feasible, modified lower quadrant signalling (MLQ), with distant signal located at 1.5 kms. from the home signal should be provided. Where neither of the above two courses was feasible, a separate electrically lit and motor operated warner signal should be provided at a distance of 1.5 kms. from the outer signal. In all these cases warning boards were to be dispensed with.
2. On routes where lower quadrant (LQ) signalling was to be replaced by multi aspect upper quadrant (MAUQ) signalling, two permissive distant signals,§ one at a distance of one kilometre and the other at a distance of two kilometres from the home signal, should be provided. The warning boards were to be dispensed with.
3. On routes provided with multi-aspect upper quadrant (MAUQ) or multi-aspect colour light (MACL) signalling, the existing distant signal was to be retained in its present location and another distant signal, i.e. 'approach signal', was to be provided at a distance of two kilometres in the rear of the home signal. The warning boards were to be dispensed with.

6.5. A review carried out by us has, however, shown that not much progress has been made by the Railways in re-siting of signals or provision of 'approach signals'. This work has so far been completed only on the Delhi-Mughalsarai section of the Northern Railway.

6.6. We also note that a Committee of Directors of the Railway Board and RDSO had gone into the question of introduction of air brakes. The Report of this Committee was submitted in April 1979. It is seen from this Report that emergency braking distances for goods trains fitted with conventional vacuum brakes and air brakes are as under :

<i>Load/speed of goods trains</i>	<i>Emergency braking distance on level track</i>
(i) 3,600 tonnes goods trains running at a speed of 75 km/h, fitted with vacuum brakes (conventional type).	1.8 kms.
(ii) 4,500 tonnes goods trains running at a speed of 75 km/h, fitted with vacuum brakes (conventional type).	2.33 kms.
(iii) 3,600 tonnes goods trains at 75 km/h fitted with air brakes (graduated release type).	0.533 kms.
(iv) 4,500 tonnes goods trains running at 75 km/h fitted with air brakes (graduated release type).	0.870 kms.

\* Cf. Paragraph 72 of the Kunzru Accidents Enquiry Committee Report Part I (1962).

† Based on 450 mm. average vacuum and 85% effected cylinders.

‡ Based on 495 mm. average vacuum and 90% effected cylinder.

§ The second distant signal, at a distance of two kilometres in rear of the home signal, was designated the approach signal.



6.7. Since 4,500 tonne goods trains would be run only with BOXN wagons fitted with air brake system, for which emergency braking distance is well within one kilometre, no problem would arise on the introduction of such trains, in respect of braking distances. As regards 3,600 tonne trains, these are presently run with BOX/BCX wagons, fitted with vacuum brakes, and emergency braking distance in their case is 1.8 Kms. Till the Railways are able to equip these wagons also with air brake system, arrangements to cater to this braking distance on such of the routes where these trains would ply would have to be made.

6.8. From the foregoing discussion, following points emerge :

1. Except for the high speed routes, referred to in paragraph 6.4 above, the question of re-siting of signals on the basis of braking distance trials, has not been settled by the Railway Board so far.
2. Even for the high speed routes, for which a directive for re-siting of signals/provision of second distant signal, has been issued by the Railway Board, the actual implementation of this directive has not progressed to any significant extent. Only a part of one of the routes, viz., Delhi-Howrah route, has been covered so far.
3. The Railway Board have so far been considering emergency braking distances as the criteria for fixing of inter-signal distances. Provision of the second distant signal (at a location 2Kms. in rear of the home signal) would, however, provide service braking distance between this signal and the home signal, for most of the trains.
4. The Railways have so far taken a decision to provide air brakes only for BOXN wagons which would be used for running of 4,500 tonne freight trains. No decision to provide air brakes in the existing BOX/BCX wagons, which are used for running of 3,600 tonne freight trains, has been taken so far.

6.9. In view of the vital bearing which the inter-signal distance have on the safe running of trains, the urgency of settling the above issues cannot be over-emphasised. Our specific recommendations in this regard, are as under :

1. Based on the results of the braking distance trials, the Railway Board should take urgent decision in regard to the inter-signal distances to be provided on the various routes. A time-bound programme not exceeding five years, should be framed for re-siting the signals to conform to the inter-signal distances so fixed.
2. Inter-signal distances should be based on the 'service braking distances' and not on 'emergency braking distances', as has been the case so far. (This is necessary because resort to emergency braking by the driver every time he has to stop suddenly, leads to skidding of

wheels, which results in damage to wheels as well as to the rails. Further more, in the case of passenger trains, emergency braking also causes dis-comfort to the passengers).

3. The Railway Board should also take an early decision in regard to equipping the existing BOX/BCX wagons with air brakes as these wagons would continue to be used for running of 3,600 tonne freight trains in the foreseeable future.

#### 7.0. Automatic Warning and Stop System (AWS).

7.1. Even after providing the highest standard of interlocking between points and signals, possibility of a train driver passing a signal at danger, if he is not attentive, is not eliminated. In this context, the Wanchoo Committee had pointed out† that a substantial number of collisions and derailments took place on account of human failure on the part of drivers to obey signals showing danger aspect. To guard against such contingencies, the Wanchoo Committee had recommended provision of a safety system, which later came to be known as Automatic Warning and stop System (AWS). This system is so designed that a driver receives an audio-visual warning in his cab in regard to the aspect of the stop signal that he is approaching and should he pass the signal at danger, automatic application of brakes takes place. This is made possible by installing two separate devices, one on the track, which is controlled by the signal ahead, and the other on the locomotive which the track device activates and sets into operation according to the aspect of the signal.

7.2. AWS exists on the entire system of the Japanese National Railways. In Germany, this system is provided on all sections having speeds higher than 100 km/h. On the British Railways, provision of AWS is mandatory on lines having speeds of 120 km/h or more, whereas in the United States AWS is provided for lines having maximum permissible speeds in excess of 130 km/h.

7.3. In India, in the late Sixties, the Railway Board decided to provide AWS; (i) on trunk routes having speeds of 120 km/h or above, only for mail and express trains, and (ii) on suburban sections for only EMU trains. Further, the first stop signal alone was to be covered by AWS.

7.4. While reviewing progress of AWS, the Sikri Committee had noted that out of 2,780 route kilometre, of trunk routes, having speeds of 120 km/h or above and 1,128 route kilometres in suburban sections in Calcutta, Bombay and Madras areas, AWS had been provided on 248 and 94 kilometres respectively. The poor progress of provision of AWS was attributed, by this Committee, to the reluctance on the part of the Railway Board to import the necessary equipment required for this system, and the excessive time taken for indigenous development of the equipment.

7.5 We find that AWS was first installed, in the Seventies, on Howrah-Burdwan (Chord line) and Gaya-Mughalsarai sections of the Eastern Railway and it covered only the first stop signals. The AWS on these

\* In the case of 3,600 tonne freight trains, running at 75 km/h., emergency braking distance is 1.8 Kms. service braking distance, being about 20 percent higher, would be

$1.8 \times 1.2$

= 2.16 Kms. which is slightly in excess of 2 Kms.

10

† Cf. Paragraph 360 of the Wanchoo Accidents Enquiry Committee Report, Part II (1969).



two sections initially functioned well there were no failures of equipment on the 'unsafe side' and no accidents occurred due to drivers passing first stop signals at danger. But soon large scale thefts of the track side device started taking place, because of the 15 kg. of aluminium available in the casing of the track device. Further, only a limited number of locomotives were fitted with AWS equipment, to cover the mail and express trains. Frequent changes of these locomotives from these sections to others were also made, in the interest of their better utilisation, resulting in many of the locomotives fitted with AWS equipment being lost to these two sections which were provided with AWS equipment in the field.

7.6. We understand that in view of the un-satisfactory functioning of AWS on account of thefts of the track device, the Railway Board have now decided to defer even the approved works for provision of AWS, except those on the Eastern and Western Railways, which are already in progress.

7.7. To obviate thefts of field equipment of AWS, we had recommended in Part I of our Report (submitted in April, 1982) that the Railways should expeditiously develop and provide fibre glass casings for the field equipment.\* No progress in this regard seems to have been made by the Railways so far, even though more than a year has elapsed since this recommendation was made. We reiterate that the Railways should develop and provide fibre glass casing for field equipment of AWS on a high priority.

7.8. We have examined the question of routes on which AWS should be provided. In view of the safety that this system provides against 'human failure', on the part of drivers, we recommend:

1. In the first phase AWS should be provided on all suburban sections as also other sections having maximum speed of 120 km/h or over. This should be completed in the next five years.
2. In the next phase, sections having speeds exceeding 100 km/h but less than 120 km/h should be covered. This phase should be completed within a further period of five years.

#### 8.0 Last Vehicle Check Device (LVCD)

8.1. General Rules of the Indian Railways stipulate that 'permission to approach' for a train shall not be given by a station in rear, unless the 'whole' of the previous train has already arrived at the station. At present, compliance to this rule is being done by station staff through a visual verification of the last vehicle board by day and red light of 'tail lamp' by night. At stations provided with two end cabins this verification is normally entrusted to the cabinmen/ASMs in charge of these cabins.

8.2. It was brought out in evidence before the Sikri Committee that considerable difficulties were being faced by station staff in checking the complete arrival of a train, particularly during night time and inclement weather. This situation becomes further complicated in cases of stations provided with a central cabin for operation of all signals and points. In such cases, complete arrival of a train is normally ascertained by sending a member of the station staff to the end of the platform for obtaining a certificate to this effect from

the guard of the train. This causes delays to train operations.

8.3 On many of the Railway Systems abroad, complete arrival of a train at a station is verified by installing a device known as Last Vehicle Check Device. LVCD works on the same principle as AWS and consists of two sets of equipment, one to be fitted on track and the other on the last vehicle of the train. The equipment on the last vehicle, in conjunction with the track equipment, fitted inside the home signal, gives the necessary release to the signalling and block circuits, after complete arrival of the train.

8.4 We have been told that efforts to develop an indigenous design of LVCD have been going on for over two decades. Not only that no finality has been reached in this matter but indications are that the development of an indigenous design may not be possible for many more years. Since LVCD would result in clear benefits not only in respect of safety of train operations but also in regard to enhanced line capacity, installation of these devices should not be delayed any further. We, therefore, recommend that the Railways should import a few LVCDs of a 'proven' design, and instal them for field trials. If suitability of these LVCDs in our conditions is confirmed by the trials, production of the equipment as per this design should be taken up by importing the necessary technology.

#### 9.0 Hot Box Detectors.

9.1 One major hazard in running of trains is the problem of hot boxes. Timely detection of hot boxes has assumed greater importance in the wake of introduction of heavier and faster freight trains, with increased length of runs between two successive stops. The problem of hot boxes is more severe in cases of goods wagons having plain bearings. Normally, the axle box of a wagon is prevented from getting hot, by providing grease for roller bearings, and for plain bearing by providing jute rolls filled with oil, in the axle boxes. This arrangement helps to keep the axles of a moving train at ambient temperature or slightly higher. When an axle of a wagon becomes hot, due to any reason, the wagon no longer remains safe to run and has to be detached from the train. A wagon with hot box, if not detected in time and detached, might lead to a serious accident.

9.2. Presently detection of hot boxes on a running train is done, by visual observation of the condition of the axle boxes, by the station master and cabin staff when it arrives at a station. When there is a hot box on a train, whistling sound is heard or smoke or flames can be seen by the station staff. In this method it is not possible to detect a hot box at early stages since no audible or visual indication of this defect is available. Further, this method relies on human agency and in the event of a 'human failure' there is every possibility of the train continuing its run with a hot box, which might eventually result in a serious accident.

9.3. To overcome the above shortcomings, some of the Railway Systems abroad employ devices known as Hot Box Detectors. Two scanners are placed one on either side of the track to scan the axle boxes of a passing train. These scanners detect any infra-red radiations coming out from hot axle and convert them into electrical impulses. These impulses are processed in a data processing unit and recorded on graphical chart.

\* Cf. paragraph 4.21.5 of Part I of our Report.



Any abnormally high peak on this graph indicates the presence of a hot axle.

9.4. Two hot box detectors were imported and installed on the Eastern Railway in December, 1977 for field trials. The trials have indicated satisfactory performance of these devices.

9.5. The next logical step should be to set up production capacity for this type of hot box detectors in the public or private sector to meet the requirements of the Railways. There should be no difficulty in this as we believe that adequate expertise and capacity to undertake their manufacture would be available indigenously, once the Railways have made up their mind about the number of such detectors they would need annually.

9.6. The severity of the problem of hot boxes would, however, gradually reduce in the times to come with the replacement of the existing 4-wheeler wagons by eight-wheeled stock. The eight-wheeled stock, which is provided with roller bearings, is, however, prone to seizure of bearings which is also preceded by the axle boxes getting hot. Hot box detectors would, therefore, be required for the eight-wheeled stock also. We, therefore, recommend that hot box detectors should be provided on all the arterial routes at intervals of 100 Kms. within the next five years.

#### 10.0 Hazard Detectors.

10.1. Some of the Railway Systems abroad, where heavier freight trains at higher speeds are run, use additional safety devices called hazard detectors. These are mainly of two types:

- (i) Dragging Equipment Detectors (DED), for detecting loose/hanging fittings of rolling stock, and,
- (ii) Open Door Detectors, for detecting open doors of freight stock.

10.2 *Dragging Equipment Detector*:—A Dragging Equipment Detector is an electro-mechanical device and is provided at the approaches of station. This device is interlocked with stop signals at the station. Whenever any loose fitting is hanging from a wagon or coach, it activates the dragging equipment detector, installed on the track, putting the signal to danger aspect.

10.3. Open Door Detectors too are electro-mechanical devices and work on the same principle as Dragging Equipment Detector. These are also provided near the stations.

10.4. In the context of running heavier freight trains, it is essential that similar hazard detectors are also provided on the Indian Railways. Provision of these detectors would go a long way in timely detection of loose fittings or open doors, thereby eliminating possibilities of accidents taking place on this account.

#### 11.0 Electric Lighting of Semaphore Signals

11.1. In view of repeated complaints about distant signals not being lit during night in many cases, and their serious repercussions on safety, the Wanchoo Committee had recommended that the Railways should explore the possibility of switching over to electric lighting of semaphore signal, wherever possible.

11.2. We find that even though the Railway Board had accepted this recommendation and issued suitable instructions to Zonal Railways, no worthwhile progress has been made in this direction. As on 31 March, 1982, this work had been completed on less than 100 stations. Non-availability of reliable power supply and a switching device of suitable design were cited as the main reasons for the poor progress of the work.

11.3. We have noted that twilight switches and photo-voltaic cell panels, using solar energy, have recently been developed in the country. These devices have been successfully used at a few stations on the Northern Railway, for electric lighting of distant signals. This has resulted in the visibility of such signals being increased from less than one kilometre to about 1.5 kms. Since in this arrangement, lighting of signals does not depend on any human agency but is automatic, the possibility of semaphore signals not being lit at night has been eliminated. Further, it also makes lighting of semaphore signals independent of erratic power supply. The Committee, therefore, recommend that such photo-voltaic cell panels, which are not very costly, should be used by the Railways on a larger scale.

#### 12.0 Conclusions.

12.1. There are still 23 block stations on the Broad Gauge and 44 on the Metre Gauge, which remain to be interlocked. As interlocking is a basic requirement for safety, the Railways should provide at least 'rudimentary' interlocking at these stations, within the next two years.

12.2. On the Narrow Gauge, out of 331 block stations, 229 have not been provided with interlocking so far. We have, however, recommended earlier in Part II of our Report on TRANSPORTATION that Narrow Gauge sections, except those serving hill stations or the Narrow Gauge system in Central India, should be closed down. In respect of Narrow Gauge stations, the Railways should, therefore, provide rudimentary interlocking on such of the sections which would not be closed down, but also within the next two years.

12.3. Progress of provision of track circuiting at stations on 'run-through' and other passenger line, together with its extension upto block section limits has been unsatisfactory. This tardy progress has been attributed to paucity of funds, shortage of wooden sleepers and unsuitability of present design of concrete sleepers for 'unrestricted' use in track circuiting.

12.4. To accelerate the pace of track circuiting, so as to complete this work in respect of trunk routes, main lines and important junction-stations on branch lines by 1990, annual allotment of funds would require to be enhanced to Rs. 60 crores. Since funds to this extent are not available in 'ACSPF', to which such works are presently charged, track circuiting should, in future, be charged to 'Capital'. Since track circuiting is essentially needed for safety, rate of return need not be worked out to establish financial remunerativeness for such works, while charging them to 'Capital'.

12.5. In view of the dwindling forest resources the Railways would have to face a continuing shortage of wooden sleepers in the years to come. The Railways would, therefore, have to place greater reliance on concrete sleepers for track circuiting work. The existing design of concrete sleepers should, therefore, be expeditiously improved for unrestricted use for track circuiting.



12.6. Axle counters provide an alternative to track circuiting. Apart from being comparatively cheaper, their use has numerous other advantages also. The Railways would, therefore, have to go in for axle counters in a big way, in lieu of conventional track circuiting.

12.7. The Railways should develop adequate indigenous capacity in public sector or private sector to undertake manufacture of axle counters.

12.8. Based on the recommendations made by the Commissioners of Railway Safety, the Railway Board have been issuing instructions from time to time, for providing certain safety features in the signalling equipment at stations. Progress in this regard has, however, been slow as the Railways have mainly undertaken these works, either at the time of replacement of signalling gears, when this became due, or along with major traffic facility works like Doubling, Conversion, Electrification, etc. As provision of these features is essential for safety of train operations, the Railways should complete these works within the next five years, by undertaking their installation as independent works, if necessary.

12.9. In regard to manned level crossings, considerable work still remains to be done in respect of provision of interlocking, telephones and warning bells. The remaining work should be completed within the next five years. At such of the unmanned level crossings where visibility for road users or train drivers is restricted, electronic hooters, actuated by approaching trains, should be provided, to ensure safety of road users.

12.10. The Railways have not yet completed the work of re-siting of signals to conform to the braking distances. This should be expedited.

12.11. Inter-signal distances should be based on service braking distances instead of emergency braking distances.

12.12. The Railways should take an early decision in regard to the equipping of the existing BOX/BCX wagons with air brakes, as these wagons would continue to be used for running 3,600 tonne freight trains in the foreseeable future.

12.13. AWS is a safety system which acts as a check on 'human failure' on the part of drivers to obey signals at danger. In view of the safety that this system provides, the Railways should instal AWS on all suburban sections as well as other sections having maximum speeds of 120 km/h or over, in the first phase, to be completed in five years. In the next phase, sections having speeds exceeding 100 km/h but less than 120 km/h, should be covered by AWS. This phase should be completed in the next five years.

12.14. The Railways efforts to develop a Last Vehicle Check Device have not succeeded in the last two decades. We suggest that the Railways should import a 'proven' technology for undertaking manufacture of these devices.

12.15. Hot box detectors are very useful for detecting hot axles on trains, to prevent accidents. The Railways have already found the performance of two imported prototype hot box detectors satisfactory. We believe that expertise and capacity for production of this solid state device is now available in the country. We recommend, for reasons indicated by us, that such

detectors are provided on the arterial routes covering them within the next five years.

12.16. Other hazard detectors which can be used by the Railways for ensuring safety are:

- (i) Dragging Equipment Detectors, for detecting loose/hanging fittings of rolling stock, and
- (ii) Open Door Detectors for detecting open doors of freight wagons.

The Railways should instal these hazard detectors on the routes on which heavier freight trains would ply.

12.17. The Railways should implement a time-bound programme for electric lighting of semaphore signals. In this connection, the Northern Railway has successfully experimented with the use of photo-voltaic cell panels for electric lighting of semaphore signals. We recommend use of these panels on wider scale.

*Annexure A.2.1*

(Cf. para 5.6)

#### History of the Policy changes occurred during the last two decades.

(Railway Board)

No. 27/W-3/SG/LX/2 New Delhi, dated 16-3-1979.

General Manager,  
Indian Railways.

\*With 9 spare copies.

Sub.—Safety Devices at Level Crossings.

Ref.—Board's letters No.

- (i) 60/W3/SG/2, dated 12-1-60.
- (ii) 60/W3/SG/2, dated 28-9-60.
- (iii) 59/W3/TN/38, dated 22-5-61.
- (iv) 62/W3/SGA/13, dated 28-8-62.

- (v) 62/W3/SG/115, dated 26-3-64.
- (vi) 63/W3/SG/83, dated 2-8-66.
- (vii) 63/W3/SG/88, dated 23-11-65.
- (viii) 62/W3/SG/115, dated 12-4-67.

- (ix) 63/W3/SG/88, dated 12-2-68.
- (x) 68/Safety-II/29/4, dated 17-5-68.
- (xi) 63/W3/SG/88, dated 18-7-69.
- (xii) 69/W3/SG/LX/1, dated 19-9-63.

- (xiii) 69/W3/SG/LX/1, dated 14-1-70.
- (xiv) 69/W3/SG/LX/1, dated 14-5-70.
- (xv) 62/W3/SG/116, dated 15-9-70.

- (xvi) 63/W3/SG/88, dated 16-11-70.
- (xvii) 69/W3/SG/LX/1, dated July 1971.
- (xviii) 77/W3/SG/LX/2, dated 28-12-77.

In the past Ministry of Railways have issued a number of instructions for Interlocking, Provision of Telephone and Approach Operated Warning Devices at Level Crossings. All these instructions have been reviewed in the Safety and Signalling Directorates of this Ministry in the light of the recommendations made by Commissioner of Railway Safety and various Accidents Enquiry Committees from time to time. Taking into account the progress already made in the implementation of the



earlier directives, instructions for the provision of safety devices at each type of level Crossings are consolidated below for information and necessary action.

## 2. "Special" Class Level Crossings :

(These shall be normally kept open to road traffic).

### 2.1. Within Station Limits.

- (a) Should be interlocked.
- (b) Telephone Communication with A.S.M.'s office should be provided.
- (c) Where the Level Crossings Gate is operated from a place other than the place of operation of the Signal protecting the gate, arrangements of interlocking should be such that the last operation before taking 'OFF' the Signal should be the closing of the gate and the first operation after the train has cleared the Level Crossing and the Signal has been put back to 'ON' position should be the opening of the gate by the gateman.
- (d) Should be equipped with Lifting Barriers.

### 2.2. Outside Station Limits.

- (a) Should be interlocked.
- (b) Telephone communication with A.S.M.'s office of adjoining station should be provided.
- (c) Warning Bell operated by the approach of a train should be provided.
- (d) Should be equipped with Lifting Barriers.

### 2.3. 'A' Class Level Crossings.

(These shall be normally kept open to road traffic).

#### 3.1 Within Station Limits.

- (a) Should be interlocked.
- (b) Telephone Communication with A.S.M.'s office should be provided.
- (c) Where Level Crossings Gate is operated from a place other than the place of operation of the Signal protecting the gate, arrangements of interlocking should be such that the last Operation before taking 'OFF' the Signal should be the closing of the gate and the First Operation after the train has cleared the Level Crossing and the Signal has been put back to 'ON' position should be the opening of the gate by gateman.
- (d) Should be equipped with lifting Barriers

#### 3.2. Outside Station Limits.

- (a) Should be interlocked.
- (b) Telephone Communication with ASM's office of adjoining station should be provided.

- (c) Provision of Warning Bell operated by the approach of a train to be invariably provided on Suburban all sections and on non-suburban sections provided with Automatic block Signalling. At other places the Railways may provide this facility where it is considered desirable by the railway administration, on account of Local Conditions.

- (d) Should be equipped with Lifting Barriers.

### 4.0. (B) Class Level Crossings.

(These Level Crossings both within station limits and outside station limits, falling on sections provide with systems of train working other than Automatic Signalling/APB).

These shall be normally kept closed to road traffic.

- 4.1. The safety aids to be provided under this condition are given below :

#### 4.1.1. Within Station Limits:

- (a) Telephone communication shall be provided with the A.S.M.'s office.
- (b) Lifting Barriers shall be provided.
- (c) In suburban sections, the level crossings shall be interlocked.
- (d) On non-suburban sections, where the gates are operated by Cabin Staff of Cabins adjoining the Level Crossings, the Level Crossings should be interlocked with the station Signals.

#### 4.1.2. Outside Station Limits.

- (a) Telephone communication shall be provided with the A.S.M. of adjoining station at all the level crossings gates on Rajdhani Express Routes and on Suburban Sections. On other Routes such communications shall be provided at those Level Crossings which are situated in curves obstructing the view of the level crossings from approaching trains and vice-versa.
- (b) Lifting Barriers shall be provided.
- (c) In suburban sections the Level Crossings shall be Interlocked.

- 4.2. An immediate census of traffic shall be taken in respect of those 'B' Class Level Crossings Gates which are of at present kept normally open to road traffic. All such of those level crossing gates where the traffic density warrants upgradation of the level crossings to either 'A' Class or 'Special' Class, immediate steps should be taken to upgrade them. Pending the formal upgradation of such gates to 'A' Class or 'Special' Class, facilities as contained in paras 2 and 3 may be provided at those Level Crossings Gates. Such of those level Crossings, which do not warrant upgradation to 'A' Class or 'Special' Class, as a result of the census, should have their gates normally kept closed to road traffic and facilities provided as indicated in Para 4.1 above.



## 5.0. 'C' Class Level Crossings (manned).

(These Level Crossings both within station limits and outside station limits, falling on sections provided with a system Train working other than Automatic Signalling/APB).

These shall be normally kept closed to road traffic.

## 5.1. The safety aids to be provided for such level crossings are indicated below :

## 5.1.1. Within Station Limits.

(a) Telephone communication with the ASM's office shall be provided.

(b) Where the gates are operated by Cabin Staff of Cabins adjoining the Level crossings, the Level Crossings shall be provided with Lifting Barriers and interlocked with the Station Signals.

## 5.1.2. Outside Station Limits.

(a) Telephone Communication shall be provided with the ASM of adjoining station at all the level crossings gates on Rajdhani Express Routes and suburban sections. On other routes such communication shall be provided at those level crossings which are situated in a curve obstructing the view of the level crossings from approaching trains and vice-versa.

5.2. An immediate census of traffic shall be taken in respect of those 'C' Class Level Crossings Gates which are at present kept normally open to road traffic. At these level crossing gates where the traffic density warrants upgradation of the level crossings to either 'A' Class or 'Special' Class immediate steps should be taken to upgrade them. Pending the formal upgradation of such gates to 'A' Class or Special Class, facilities as contained in paras 2 or 3 above may be provided at these level crossing gates. Such of these level crossings which do not warrant upgradation to 'A' class or 'Special' Class as a result of the census, should have their gates normally kept closed to road traffic and facilities provided as indicated in Para 5.1 above.

5.2.1. In case of Level Crossings falling on suburban Sections they may be considered for upgradation to 'B' Class in the event of their not qualifying for upgradation to 'Special' or 'A' Class and when so upgraded to 'B' Class facilities as indicated in para 4 shall be provided.

5.2.2. Attention is invited to Board's letter No. 72/WI/LX/105 dated 29-12-78 wherein the periodicity of conducting census cum job-analysis at level crossing gates have been given for assessing the need to upgrade and/or man such lever crossings. Where, it is decided to man an existing unmanned 'C' Class Level Crossings as a result of such a review, facilities as indicated in Para 5.1 shall be provided.

In all cases where telephone communication with ASM's office has been stipulated, the connection may be given with the Switchmen in the adjoining Cabins, where so required under local operating conditions.

**Level Crossings both within and outside station falling on sections provided with Automatic Block Signalling/A.P.B.**

The Level Crossings gates situated on sections provided with Automatic Signalling/APB shall be interlocked irrespective of the classification. In addition, they shall be provided with warning Bells operated by the approaching trains. Besides, approach locking should be provided on the Control lever of the level crossing so that only when the portion of the track/tracks between the level crossing and the signals protecting the level crossing are clear, can the gates be opened. (as already stipulated in Board's letter No. 77/W3/SG/LX/2, dated 28-12-77).

These instructions supercede all the previous instructions issued in the past on the subject Wherever facilities more than the minimum specified above, have already been provided the same shall be retained.

Safety Devices at the level crossings, may be planned on this basis on your Railway.

Please acknowledge receipt of this letter.

Sd./-  
(K. Subrahmanyam)  
Addl. Director (Signals)  
Railway Board

No. 77/W3/SG/LX/2.

New Delhi, dated 16-3-1979

Copy forwarded for information to :

1. The General Managers (S&T)/Const., Central, Eastern, Northern, Southern, South Central, South Eastern and Western Railways. (with five spare copies each).
2. The Commissioner of Railway Safety, 16-A, Ashok Marg Patiala House, Lucknow. (with five spare copies).
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Sd./-  
(K. Subrahmanyam)  
Addl. Director (Signals)  
Railway Board.

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## CHAPTER III

### SIGNALLING : PROFILE FOR THE FUTURE

#### 1.0. Introduction.

1.1. We mentioned in Part II of our Report on *Transportation* the about 75 per cent of freight and 55 per cent of passenger traffic move on a few 'arterial routes', which constitute only around one-fourth of the total railway network. These routes have witnessed a heavy traffic growth in the past and are now working to near saturation limit. In future also these very routes are expected to experience a high rate of traffic growth. A substantial augmentation in line and terminal capacity on these routes would, therefore, be needed to enable them to handle the 'very heavy' traffic density to which they are likely to be subjected by 2000 AD.

1.2. The remaining main line routes are also expected to witness increases in traffic, during the next two decades, but in their case the growth would not be as profile as for the arterial routes. As a result, traffic density on these main line routes, by the turn of the century, would vary from 'moderate' to 'heavy' and commensurate measures to augment their capacity would also have to be undertaken.

1.3. In the foreseeable future, as far as branch lines are concerned, traffic density for them is likely to remain light and speeds low. There would, therefore, be no necessity for providing any major inputs on these lines for augmenting their traffic carrying capacity.

1.4. Over the years there have been rapid advances in signalling techniques. Modern signalling provides an economical means for increasing the traffic carrying capacity of a route. The Railway Board have, however, not so far framed any integrated plan to systematically upgrade the signalling systems on various categories of routes, to cater for the above profile of traffic growth. As a result, whatever improvements in signalling have been made in the past, have been sporadic, forced more by crisis situations, than in pursuance of an integrated time bound plan. For instance, a systematic upgradation of signalling systems on 'complete' routes has not been undertaken so far; different types of signalling ranging from the elementary to the sophisticated, still continue to exist on many heavy density routes. This anomaly would need to be rectified through a systematic upgradation of signalling systems, on a route-wise basis.

#### 2.0. Modern signalling techniques.

2.1. Before we attempt to delineate any future profile for signalling, it is necessary to discuss the different modern signalling techniques available and their suitability on the various categories of routes of Indian Rly.

2.2. *Tokenless working.*—At present, train working on single line sections is mainly done with 'token' type block instruments.\* The use of these instruments for block working, has the following inherent disadvantages :

1. Considerable delay takes place when two trains are required to cross at a station because the token from the incoming train has to be collected and put back in the block instrument before a token can be extracted and sent for the departure of the other train.
2. Drivers of 'run-through' trains tend to bring down train speed for picking up token from stations not provided with 'token pick-up apparatus'\*\*. This has an adverse effect on the line capacity of the section.
3. Incidence of tokens being 'missed' or 'over-carried' by drivers of run-through trains particularly on high speed routes is not infrequent. This results in delays.
4. On sections where there is predominant traffic in one direction, a periodical balancing of tokens has to be carried out between the block instruments of two adjacent stations. This not only involves delays to train operations but also has a bearing on safety. In this context the Sikri Committee had commented as under :

".....If safety of train operation is to be ensured during the process of token balancing, block working should be suspended and the passenger train by which the signal maintainer is travelling should be worked on 'paper line clear' system and the maintainer should get down at every station, open the block instrument, remove the excess tokens and proceed to the next block station to replenish the stock of tokens in the instrument there and then restore the block working and so on to the next station, till the entire section is covered. While the time-consuming procedure can be followed in sections with light and medium levels of traffic, effects train services adversely on heavy density sections and hence maintenance staff resort to the unsafe practice of balancing the tokens without suspending the block working .....".†

2.3. The above inherent deficiencies of token type block instruments can be overcome by using 'tokenless' block instruments. Further, tokenless working eliminates the need of a 'tangible authority' to the driver for entering a block section and thereby provides a uniform system of train working, as viewed from the driver's angle, for single and double line sections.‡ Tokenless

\* In this system, two block instruments, provided at the stations at the two ends of a block-section, are electrically connected in such a way that once a 'token' has been extracted from one of the block instruments, no further 'token' can be taken out either from that instrument or from the corresponding instrument at the other end of the section, until the token which was extracted from the first instrument, has been put back in one or the other instrument. The token is in the shape of a 'ball' a 'tablet' or a 'key' and forms a 'tangible authority' for the driver of a train to proceed in to the block section.

\*\* Many sections have not yet been provided with token pick-up apparatus.

† Cf. Paragraph 333 of the Sikri Railway Accidents Enquiry Committee Report, Part II (1981).

‡ Block instruments on double line sections are already of tokenless type. Authority for the driver to proceed into a block section, on such sections, is 'off' aspect of the starter signal.



working is, therefore, also ideally suited for such of the single line sections which are sandwiched between two double line sections.

2.4. The Committee note that the Railways, in the recent past, have provided tokenless block instruments on a few heavily worked patches of busy single line sections.\* In view of the distinct advantages of tokenless working, it would be worth-while to further extend its use on such of the single line sections on trunk routes and main lines which are not likely to be provided with double line in the near future. The Committee, therefore, recommend that, for stations on such of the trunk routes and main lines which are not likely to be doubled in the near future, replacement of the existing token type block instruments, whenever due, should be undertaken by tokenless instruments.

2.5. *Multi-aspect signalling.*—In view of the established advantages \*\* of multi-aspect signalling of upper quadrant or colour light type, over the two aspect lower quadrant signalling, both the Wanchoo and Sikri Committees had recommended that all stations on trunk routes and main lines should be provided with the former type of signalling. This recommendation was accepted by the Railway Board, but there have been distortions in its implementation. Provision of multi-aspect signalling has not been progressed on a 'route-wise' basis. As a result, there are still many sections on trunk routes and main lines which have not yet been fully covered by this type of signalling, while some branch line stations have been provided with this facility. This is evident from the fact that on 31 March 1982, out of 2,529 stations provided with multi-aspect signalling, about 500 were on branch lines. Such distortions could have been avoided had the Railways undertaken upgradation of signalling systems on a route-wise basis and progressed the implementation on the trunk routes first. The Railway Board should now frame and implement a phased programme for providing multi-aspect signalling first on the remaining stations on the trunk routes and main lines which constitute the arterial routes. This should be completed in the next five years. In the subsequent phase, the remaining main lines should be provided with this type of signalling. In the case of branch lines, there is, however, no necessity to go in for multi-aspect signalling as these lines are expected to carry light traffic in the foreseeable future also.

2.6 *Intermediate block signalling (IBS).*—Whenever certain stretches on double line sections get saturated, line capacity on these stretches is sought to be increased by splitting up long block sections into smaller ones. This splitting can be done by providing either 'block huts' or intermediate block signalling† (IBS). Unlike IBS, block huts have to be manned and this involves recurring expenditure on staff. Furthermore, block huts suffer from the following disadvantages :

1. Block huts are usually located in midsections, away from places of habitation. As a result, these are not popular places of posting with the staff, who tend to reside in the near-by towns and commute to these block huts daily.

2. Since trains do not stop at these block huts, there is a tendency on the part of the staff to stop the trains 'out of course', for entraining and detraining. This leads to train detentions.

2.7. We, therefore, recommend that whenever the need for splitting up of long block sections for increasing line capacity arises, the Railways should go in for IBS in preference to the manned block huts. So far as the existing block huts@ are concerned, the Railways should draw out a time-bound programme to replace them by IBS.

2.8. *Automatic signalling.*§—In this system of signalling, which is used on double/multiple line sections, continuous track circuiting‡ and colour light signals at suitable intervals are provided. Signals are, however, automatic i.e. they automatically change to 'off' position when the track section ahead is clear of trains. This system is specially suitable for sections where traffic density is very heavy and trains follow one another in quick succession.

2.9. *Automatic signalling on suburban sections.*—On the Indian Railways, except a few isolated non-suburban sections,@@ this system of signalling has mainly been provided on the suburban sections around the metropolitan cities. Even on these suburban sections there are still many gaps where automatic signalling is yet to be provided. For instance, whereas the 'up' line on Howrah-Seoraphuli section has automatic signalling, the two 'down' lines on this section continue to be worked with manual signalling. Some important suburban sections around Delhi, like Delhi-Sonepat, Delhi-Palwal and Delhi-Rohtak, have also not been provided with automatic signalling so far.

2.10. Apart from the metropolitan cities, suburban traffic has also been growing around other major cities like Lucknow, Kanpur, Nagpur, Ahmedabad, Hyderabad, Bangalore, Bhopal, Jaipur, etc. Manual signalling existing on the sections around these cities would not be able to cope with the fast increasing suburban traffic and would need to be replaced by automatic signalling in the near future.

2.11. We, therefore, recommend that the Railways should undertake a phased programme to replace the existing manual signalling by automatic signalling on all these suburban sections. In the first phase, which should be completed in five years, the remaining suburban sections around the metropolitan cities should be equipped with automatic signalling. In the next phase, to be completed in a further period of five years, sections around other major cities referred to above, where suburban traffic has been growing very fast, should also be provided with this type of signalling.

2.12. Full advantage of automatic signalling on the suburban sections can, however, be derived§§ only when the terminals into which these sections lead have adequate capacity. It is, therefore, essential that simultaneously with the provision of automatic signalling, capacity constraints in these terminals, if any, are also removed

\* The number of block sections having tokenless working on 31-3-1982 was 841.

\*\* Cf. Paragraph 2.4 and 2.6 of Chapter I.

@ As on 31-3-1982, there were 163 block huts on the Railways.

§ As on 31-3-1982, automatic signalling had been provided on 1,457 track kilometres, most of it on the suburban sections.

‡ Axle counters are also used in lieu of track circuiting.

@@ For instance, Ambala-Rajpura section (28 Kms.) of Northern Railway.

§§ For instance, full advantage of automatic signalling on New Delhi-Ghaziabad section could not be derived until New Delhi station yard was remodelled and provided with route relay interlocking.



by remodelling them and by other means such as provision of route relay interlocking\*.

2.13. *Automatic signalling on trunk routes and main lines.*—To cope with the fast increasing traffic, trunk and 'important' main line routes are gradually being provided with double line track. The trunk routes, forming the sides and diagonals of the quadrilateral, have already been doubled except a few bits, where also doubling is presently in progress and would be completed soon. Even with doubling, traffic density on most of these routes has reached near saturation limits. As a matter of fact, certain stretches on these routes have already become bottlenecks and are in need of immediate relief. Some of these routes are likely to witness heavy growth in traffic in the years to come. To cater to this traffic growth, the Railways would have to augment their line capacity substantially. There are two alternatives which can be adopted for this purpose : (i) provision of automatic signalling, or (ii) provision of a third track.

2.14. These trunk and main line routes, however, carry 'mixed' traffic, comprising fast mail/express trains and slow passenger/goods trains. The speed differential\*\* between these two types of trains is considerable. In such a situation, provision of automatic signalling, as a measure for boosting line capacity of the 'route as a whole', does not yield optimum results. Unless the Railways are able to narrow down the speed differential between the fast and slow trains, provision of automatic signalling in preference to the third track is not likely to prove a better alternative for augmenting line capacity of these routes. Besides, the third track on these heavy density routes would provide a separate corridor, which can be exclusively used for running of fast inter-city trains or fast fixed-rake diesel or electric hauled freight trains, thereby providing greater flexibility in train operation. Therefore, for augmenting line capacity of trunk routes and important main lines, it would generally be preferable to go in for a third track † instead of automatic signalling. This third track should be provided with duo-directional signalling arrangements. It would, however, clearly be desirable for the Railways to carry out a cost-benefit analysis to assess the implications in respect of each individual route.

2.15. There may be certain small stretches on these trunk and main line routes, especially those located between important junction-stations, where traffic density has become heavy and immediate relief is needed. On such stretches, line capacity can be increased by introducing automatic signalling. Such a course of action has been adopted by Northern Railway for Ambala-Rajpura and Allahabad-Naini Sections, where provision of automatic signalling has enabled running of 56@ and 54@trains respectively, each way in 24 hours, instead of about 40 previous to the change. This approach cannot, however, be extended to cover 'complete routes' since increase in line capacity for them would not be to the same extent.

2.16. *Panel Interlocking*†.—We had mentioned in Chapter I that panel interlocking provides the following advantages : (i) increased safety in train operations, (ii) increased line capacity, and (iii) economy in staff. On the Indian Railways these advantages could not be

derived in full, as would be seen for the reasons explained below.

2.17. At the time of introducing panel interlocking at wayside stations in the Sixties, track circuiting of reception lines was not made mandatory. Instead, it was considered that safeguards, similar to those applicable to stations having a single central cabin with mechanically operated points and signals, would be enough for ensuring safety. With the experience gained on the working of this system, it was found that for ensuring adequate safety, track circuiting of the reception lines was necessary. The Railway Board accordingly decided, in the late Seventies, that all future schemes of panel interlocking must include track circuiting of reception lines and in the case of those stations where panel interlocking had already been completed without track circuiting, this facility should be provided within a short period of time. Due to shortage of wooden sleepers/axle counters, it has not been possible to complete this work of track circuiting so far. As a result, safety standards in train operations have continued to suffer.

2.18. Another lacuna, having a bearing on safety in panel interlocking is that this system does not provide verification of 'complete arrival' of trains at stations. In the case of two-cabin mechanical signalling, verification of complete arrival of trains was the responsibility of cabinmen. In the case of panel interlocking, which replaces the two end cabins by a centralised panel in the station master's office from which points and signals can be operated, complete arrival of a train stopping at the station, has to be verified by sending a pointsman/porter to the Guard and obtaining a certificate from him to this effect. This causes considerable delay to the trains at the time of crossings and in fact off-sets the main advantage being aimed at. This deficiency can be overcome by providing last vehicle check device (LVCD) or by other means such as checking clearance of block sections with the help of axle counters or continuous track circuiting. The Railways have not been able to provide LVCDs largely because they have so far not been able to develop an indigenous design for LVCD, nor have they imported technology for its indigenous manufacture. Provision of continuous track circuiting or axle counters continues to be hampered on account of shortage of wooden sleepers/axle counters. The increased level of safety, which panel interlocking is capable of providing, has, therefore, not been achieved.

2.19. With regard to increase in line capacity, it has not been possible to derive full benefit of this feature also in the case of crossings due to the delays occurring in verifying complete arrival of trains by sending a pointsman/porter to the Guard.

2.20. So far as economy in staff is concerned, with the introduction of panel interlocking, it has been possible to close down the two cabins at the end of the station and surrender the cabin staff. Savings in staff so achieved have, however, been partially offset by the creation of additional posts for the maintenance of panel interlocking equipment and paradoxically by the need

\* This has been dealt with in detail in paragraphs (2.26 to 2.28).

\*\* In Part II of our Report on TRANSPORTATION, we have recommended that this speed differential should be narrowed down. We have suggested maximum speed for mail/express trains as 110 km./h. and for goods trains as 100 km./h.

† This approach would be equally applicable when need for the

fourth track arises, due to further growth in traffic.

@ There is still some more scope to increase the number of trains on these two sections.

† As on 31 March 1982, 417 stations have been provided with panel interlocking.



to retain some of the transportation staff.\* On some of the stations, having level crossings which were earlier worked from cabins, extra posts of gatemen had to be created after the closure of the cabins, on the introduction of panel interlocking. This further eroded the savings achieved by reductions in the transportation staff.

2.21. It is understood that in the earlier stages of panel interlocking, the Railways did not have adequate skilled staff for maintaining the sophisticated equipment used in this system. As a result, there were many failures of panel interlocking, which, in a few cases, even resulted in train accidents. This created serious misgivings about its effectiveness in ensuring safety in the minds of the traffic staff, who were the users of the system.

2.22. In view of the above, there has been considerable vacillation on the part of the Railway Board in regard to the policy to be followed on this subject. Since the late Sixties, the Railways have been pursuing a policy of providing panel interlocking at all stations, whenever mechanical interlocking became due for replacement. In December 1980, this policy was reiterated by the Railway Board and it was laid down that any departure from this policy should be made only with their prior approval. In September 1981, the Railway Board however, reversed this policy and advised the Zonal Railways that panel interlocking, in replacement of mechanical interlocking, should not be provided as a matter of rule, but only in those cases where this could be justified on cost-benefit basis.

2.23. So far as trunk routes and main lines are concerned, the latest policy directive of the Railway Board would appear to be a retrograde step. These routes carry high speed, heavy density traffic, for which panel interlocking is decidedly a superior system of interlocking. This is due to the fact that the system has not only the potential of accelerating reception/despatch of trains but also of providing increased safety and economy in the running cost of staff. These advantages can, however, be achieved only when the existing deficiency in the system viz. absence of a means of verifying complete arrival of a train, is overcome either by providing LVCD or by checking clearance of block sections with the help of axle counters or continuous track circuiting. Further, all the reception lines at stations having panel interlocking have to be track circuited up to the block section limits.

2.24. For branch line stations, however, we do not at all recommend provision of panel interlocking. Branch lines carry light traffic at comparatively low speeds. The existing mechanical signalling on these lines is considered adequate for safely meeting the requirement of speeds and traffic density. It was reported to the committee that availability of equipment for mechanical interlocking has not been satisfactory in the recent past. This appears to be due to the reason that the Railways, for many years in the past, have been consistently following a policy of replacing mechanical interlocking by panel interlocking for all stations. In the absence of supply orders for mechanical interlocking equipment, many of the firms manufacturing these equipment have diversified their production into other areas. For meeting the needs of branch lines, the Railways would, therefore, have to develop capacity for manufacturing mechanical signalling equipment either in their own workshops or in the public/private sector industries.

Once such a policy decision is taken, there should be no difficulty even for the private sector to organize this as before.

2.25. In view of the above, we recommend the following policy in regard to panel interlocking :

- (1) On trunk routes and main lines, replacement of existing two-cabin mechanical signalling should in future be only by panel interlocking.
- (2) The Railways should take immediate steps to provide track circuiting of reception lines at such of the stations where panel interlocking has been introduced without this facility. This work should be completed in the next two years.
- (3) For verifying complete arrival of trains at stations provided with panel interlocking, LVCD\*\* or continuous track circuiting/axle counters in adjoining block sections, should be installed. Till this arrangement is implemented, complete arrival of trains should continue to be verified, as at present, by sending a pointsman/porter to the Guard to obtain a certificate from him to this effect.
- (4) Panel interlocking should not be provided on branch line stations. On these lines, replacement of mechanical signalling equipment, whenever due, should be done with the same system.

2.26. *Route relay interlocking†.*—Sectional line capacity among other factors, is greatly influenced by traffic handling capacity of major yards and terminals situated on a section. Very often, these yards and terminals pose difficulties for uniform flow of traffic and become a bottleneck. Full advantage of the facilities provided in the sections can be gained only when such bottlenecks are prevented. An economical way to do so is by providing route relay interlocking for these yards/terminals, wherein all points and signals, scattered over a wide area, and controlled from several cabins, can be electrically operated and controlled from a central cabin (through switches/push buttons). Route relay interlocking provides a high degree of safety, reduces the time of operation for points and signals and thus renders train working more efficient and economical. There is also increase in the sectional capacity. Some of the advantages which have accrued by provision of route relay interlocking at Ghaziabad yard on the Northern Railway have been quantified in Annexure A.3.1. The system should, therefore, be extended to all major junction stations and terminals on trunk routes and main lines.

2.27. Since in route relay interlocking a large number of cabins are replaced by a single cabin, wherein operation of points and signals is centralised, this system, like panel interlocking, is also beset with the problem of verification of last vehicle of incoming trains. It is, therefore, necessary that wherever route relay interlocking is provided, either LVCDs are installed or the adjoining block sections are provided with continuous track circuiting/axle counters for checking the complete arrival of trains. In fact, this needs to be invariably

\* The Railway Board advised (under their letter No. 76/Safety/3/23, dated 16 April 1979) General Managers of Zonal Railways that at stations where panel interlocking has been introduced without track circuiting of reception lines, adequate transportation staff should be retained for checking clearance of these lines, complete arrival of trains, etc.

\*\* We have already recommended in paragraph 8.4 of Chapter II that the Railways should set up facilities for indigenously manufacturing LVCDs, by importing a proven technology.

† 98 junction-stations and terminals on trunk routes and main lines have been provided with route relay interlocking by 31st March, 1982.



done and should in fact be integral to the introduction of route relay interlocking at major junctions and coaching yards.

2.28. It is understood that the Railway Board have not so far framed any integrated plan of providing route relay interlocking at busy junction and terminal stations. In the absence of such a plan, each Zonal Railway has been following its own policy and as a result, even certain less busy stations have been provided with route relay interlocking even though many busy junction-stations/terminals are still without this facility. The Railway Board should draw up an integrated plan for the provision of route relay interlocking at all major junction-stations/terminals on trunk routes and main lines. In the first phase of this plan, junction-stations/terminal on the sides and diagonals of the quadrilateral and other arterial routes should be covered. Our recommendations, therefore, are :

- (1) Route relay interlocking should be provided at all junction stations/terminals on trunk routes and main lines. In the first phase, arterial routes should be covered.
- (2) To ensure automatic verification of complete arrival of incoming trains, stations having route relay interlocking must be provided with LVCD or in the alternative adjoining block sections of these stations should have continuous track circuiting/axle counters. Where route relay interlocking has already been provided without this facility, its deficiency should be made up on a high priority.

2.29. *Centralised traffic control (CTC)*.—Centralised traffic control has so far been provided on three sections viz. Gorakhpur-Chhapra (179 Kms.), New Bongaigaon-Changarsi (135 Kms.) and Madras-Tambaram (25 Kms.). Of these, Madras-Tambaram is a triple line suburban section\* and the remaining two are single line sections forming part of main line routes. While CTC on Madras-Tambaram suburban section has been functioning satisfactorily and has yielded the anticipated benefits, its performance in the other two (non-suburban) sections has not been up to the mark.

2.30. To assess the extent of advantages which have accrued from CTC, the Efficiency Bureau of the Railway Board had carried out a Work Study\*\* of the functioning of the system on Gorakhpur-Chhapra section. This study revealed that, out of the three major benefits of CTC viz. enhanced safety, increased line capacity and economy in staff, it has been possible to derive full advantage only in respect of safety. Enhanced safety in train working has resulted from the provision of continuous track circuiting on the entire section, which eliminated the possibility of signals being taken 'off' for reception/despatch of trains on 'occupied' lines/sections. Continuous track circuiting has also provided the facility of automatic verification of complete arrival of trains at a station, thereby further enhancing the element of safety in train working.

2.31. With regard to line capacity, it has been mentioned in the Study that in Western Countries, CTC

is boosting up line capacity by as much as 40 to 50 per cent. On the Gorakhpur-Chhapra section, the charted line capacity, however, increased only from 18 trains each way in 24 hours to 23 trains, on the installation of CTC, i.e. by about 28 per cent. Even this increase has mainly resulted from a change-over to APB† system of train working and provision of the facility of centralised operations of points and signals from the station master's office. Contribution to increase in line capacity by the CTC as such, has not been appreciable. The Study has, therefore, concluded : "If instructions are communicated to station masters in time, as under the conventional methods of working, there should be no significant reduction in the capacity of the section, even if CTC is withdrawn and the Station Masters entrusted with the functioning of operating points and signals".

2.32. So far as economy in staff is concerned, only some of the operating staff at the stations in CTC territory, were surrendered. Bulk of them were retained for performing commercial functions as also for train working functions during CTC failures††. Creation of a new control office at Gorakhpur, however, further eroded the benefits resulting from the surrender of the operating staff. The Study thus concluded : "As at most of the stations in India, the station staff have to be retained for commercial purposes, as on the Gorakhpur-Chhapra section, the likelihood of CTC proving economical in this country appears remote§.

2.33. Another feature of the functioning of CTC on Gorakhpur-Chhapra section, which came to the Committee's notice, is the abnormally high rate of failures in the system. The number of signal, points or interlocking failures which occurred on this section during 1979, vis-a-vis the failures on the two adjoining sections, not equipped with CTC, are given in Table 3.1.

Table 3.1

Incidence of 'points' 'signals' and other interlocking failures

Period	Gorakhpur-Chhapra (equipped with CTC) (Length—179 kms.)	Gorakhpur-Gonda (not equipped with CTC) (Length—154 kms.)	Gonda-Lucknow (not equipped with CTC) (Length—134 kms.)
January, 1979‡	502	10	10
February, 1979	345	10	7
March, 1979	636	9	8
April, 1979	538	9	9
May, 1979	473	13	12
June, 1979	416	22	11
July 1979	621	13	10
August, 1979	483	10	13
September, 1979	307	8	8
October, 1979	225	13	10
November, 1979	236	16	16
December, 1979	273	14	14

\* Out of these three lines, two lines are utilised for running suburban trains and the third for inter-city trains.

\*\* Efficiency Bureau Study No. 12/1967, entitled "Study on the working of CTC on Gorakhpur-Chhapra section of the North Eastern Railway".

† Absolute Permissive Block System. This is a system of train working which permits trains following one another in the same block section and thus increases line capacity.

†† During CTC failures, the number of which has been abnormally high on the Gorakhpur-Chhapra section, emergency working has to be restored to and train working is taken over by the station staff.

§ In our view Gorakhpur-Chhapra and New Bongaigaon-

Changarsi were not the right sections to be selected for installation of CTC. The Railways should instead have selected some heavily worked sections on the trunk routes or main lines for this purpose. In fact by selecting light sections for introduction of CTC, the Railways have done a disservice to the promotion of CTC in India.

‡ For the purpose of comparison, failure figures for the year 1979 have been taken, because from January 1980, work of gauge conversion on Samastipur-Barabanki route, of which Gorakhpur-Chhapra section forms a part, was taken up; this caused serious interference to train movements till July 1981 when this work was completed. Restoration of CTC on the converted section is still in progress.



2.34. North Eastern Railway attributed this abnormally high rate of failures to : (i) frequent break-down in power supply,\* and (ii) large scale thefts of 'relays' used in CTC, resulting from poor law and order situation in this region. This Railway accordingly expressed the view that CTC was unsuitable for areas where commercial power supply was not reliable and law and order situation was not satisfactory.

2.35. Enquiries made by us have revealed that the experience of Northeast Frontier Railway on the functioning of CTC on New Bongaigaon-Changsari section, in regard to increase in line capacity, staff economy and equipment failures, has also been more or less similar.

2.36. It is understood that the Railway Systems in the Western Countries have adopted CTC primarily to effect savings in staff costs. Since on the Railways in these countries very little commercial work is conducted at wayside stations, it has been possible for them to dispense with operating staff at such stations and to effect economies in recurring staff costs. On the Indian Railways, these economies are not possible since considerable amount of commercial work, particularly in regard to booking of passengers, is done at wayside stations. Moreover, in Western Countries CTC has mostly been introduced on double/multiple line sections where it yields comparatively higher benefits in the area of line capacity. On the Indian Railways, on the other hand, excepting Madras-Tambaram section, CTC has been introduced on single line sections, in the hope of postponing the need for doubling of these sections. In this context, it is seen that the additional line capacity generated by CTC on Gorakhpur-Chhapra section has been less than 30 percent. Besides, growth in traffic on the main line routes in the next two decades, is going to be heavy. Under these circumstances, CTC, the present day cost of which is about 45-50 percent of the doubling cost, cannot be considered a suitable alternative to doubling of the single line sections. We are, therefore, not in favour of providing of CTC on single line sections as a substitute for the doubling of the section. CTC on double/multiple line suburban sections, however, stands on an entirely different footing as would be seen from the discussion hereinafter.

2.37. *CTC in metropolitan complexes.*—Rail network around the metropolitan cities is generally complex. A number of routes having multiple tracks and provided with many criss-cross connections, converge into these cities. Train movements in these areas are too heavy and complicated to be efficiently controlled by conventional methods. Under such methods, a section controller has to continually obtain information about arrival/departure of trains, etc., from the stations, on telephone and then to manually record the same on a train chart. This leaves him little time for planning train movements in the area under his control. As a result, the utilisation of tracks in these complexes is neither efficient nor optimal.

2.38. This situation has been overcome in the advanced Railway Systems by provision of 'computer aided centralised traffic control system'. In such a system, information about movement of trains, status of points and signals etc., at various stations, is continuously transmitted from stations to the CTC centre and displayed

on an indication panel, 'on a real time basis'. Timings of 'clearing' of signals and arrival/departure of trains at the stations are also automatically fed into the CTC centre, by an automatic train chart printer. This information is stored and processed in a computer provided at the CTC centre. In accordance with preset details, the computer looks ahead for possible conflicting movements and displays conflict resolutions, on a real time basis, on the VDUs. As the data of signal conditions, tracks occupation and train movements keep getting updated, the conflict resolutions are also continuously updated, indicating the best course of movement to avoid delays/detentions within the parameters. The computer then executes the setting of points and clearing of signals by transmitting necessary commands to the concerned stations. As the entire operation of train control, including setting of points and clearing of signals is automatic, the system is very efficient and leads to intensive utilisation of tracks with minimum detentions/delays to trains.

2.39. We, therefore, recommend that such a computer aided CTC system should be introduced on the rail network around the metropolitan cities of Bombay, Calcutta, Delhi and Madras.† In this context, it may be noted that many facilities which are an integral part of CTC, such as colour light signalling, centralised operations of points and signals, continuous track circuiting, automatic signalling, etc. on many of the sections in the rail complexes around these cities, have already been provided. A substantial portion of the investment required for introduction of CTC has thus already been made and, therefore, the cost of introduction of CTC should not be heavy.

2.40. *Centralised Traffic Supervisory System.*—Intensity of traffic on the rail networks around the major cities such as Lucknow, Kanpur, Nagpur, Ahmedabad, Hyderabad, Bangalore, Bhopal, Jaipur etc., referred to in paragraph 2.10 above, has also been growing fast. Though traffic densities on the sections in these complexes are not yet as heavy as of metropolitan complexes, efficient train control by old methods has become extremely difficult. In these cases, 'centralised traffic supervisory system' can provide a suitable means for efficiently controlling train movements.

2.41. This system is similar to CTC but is comparatively simpler and cheaper because there is no facility for the operation of points and signals of the stations from one centralised location. However, as in the case of CTC, in this system also, information regarding position of trains in the area, status of points and signals etc., are continuously transmitted to the control office and are displayed on a panel. Timings of clearing of signals and arrival/departure of trains at the stations are recorded by an automatic train recording chart.

2.42. There is also a micro-processor provided, which, according to pre-set details, looks ahead for conflict in train movements and indicates on a VDU conflict resolutions on a real time basis. This releases the section controller from the routine tasks of recording train movements on a chart and planning crossings/precedences. The controller has only to regulate train movements by communicating instructions to the station masters on telephone. The responsibility for

\* Gorakhpur-Chhapra section is located in Eastern Uttar Pradesh and Bihar States where position of power supply has not been satisfactory.

† Rail networks around the metropolitan cities carry heavy, high-density, composite and criss-cross pattern of traffic, comprising

long-distance Express/Mail trains, slow moving freight trains, area pilots, EMUs and other suburban passenger trains. To deal with this complicated traffic, these networks are provided with a number of coaching terminals, and freight and marshalling yards.



executing these instructions for operating points and signals rests with the station masters. Since the regulation of a train is based on data obtained from the stations on real time basis and the conflict resolutions furnished by the micro-processor as per pre-set details, train movements become highly efficient. We recommend that this system could be provided for the sections in complexes around the major cities referred to above, where traffic movements have become heavy.

2.43. *Cab Signalling*.—In 1969 the Wanchoo Committee had pointed out that on sections where high speed trains run, the locomotive driver remains under continuous strain in trying to sight signals and interpret the aspects displayed by them. On such sections, provision of 'coded track circuits' enable continuous indication to be given in the locomotive cab about the aspects of the signals ahead. This facility, known as 'cab signalling', enables a driver to run his train with confidence and speed. Cab signalling also enables automatic application of brakes, in case signals at danger happen to get disregarded by the driver. The Wanchoo Committee had accordingly recommended that the Railways should initiate R&D efforts with a view to providing continuous cab signalling on high speed routes for achieving a greater degree of immunity from accidents.

2.44. Even after a lapse of about 14 years, it is understood that the only progress made by the Railways in this regard is a report by the RDSO on the various cab signalling systems in use in different countries and identification of the one which would be best suited in our conditions. Having selected the best system, the next logical step for the Railways should have been to fabricate this system and introduce it on a few busy suburban sections. We recommend that cab signalling should, in the first instance be introduced on the suburban sections of Calcutta and Bombay. Depending upon the increase of traffic on the suburban sections of Delhi and Madras, introduction of cab signalling in these areas could also be considered in due course.

2.45. *Mechanisation of Yards*.—Mechanisation of yards has so far been limited to mechanisation of 'humping' operations only. Besides humping, there are a few other activities, discussed by us in paragraphs 2.50 to 2.53 which, if mechanised, can also considerably reduce detentions to wagons in yards, thereby improving their turn-round period. Mechanisation of these activities has, however, not been undertaken so far.

2.46. Further, mechanisation of humping has been considered by the Railways only as a means for increasing the capacity of the yards for handling larger number of wagons per day. Consequently, mechanisation of humping in only 10 major marshalling yards, has been completed so far. A major benefit which accrued from mechanisation of humping is elimination/reduction in the damages which wagons and their contents used to suffer prior to mechanisation. Since statistics regarding damages caused during humping are either not maintained by the Railways or where maintained, are not reliable, there has not been a proper appreciation of the savings which have resulted from such mechanisation.

2.47. In the 10 marshalling yards mechanised so far, different types of equipment and system have been adopted, some imported while others indigenous. The scale of facilities provided for mechanised humping also

vary from one yard to the other. For instance, 'siding fullness indication', 'route storage system', 'wagon reliability measuring devices' 'speed detection and control devices' etc. have either not been provided in some of the yards or if provided, have not been functioning due to one reason or another. In some of the yards, the 'retarders' provided, have to be operated manually while in others they are automatic. As a result, it has not been possible to derive in all cases full benefits of the mechanisation of humping. In some of the yards even after mechanisation, 'skid' porters continue to be employed though in reduced numbers.\*

2.48. In view of the above, we recommend that the Railways should make an evaluation of the various systems of mechanisation of humping in use within the country and abroad, with a view to selecting the best one suited for our needs. The system so selected should, inter alia, take care of the following :

1. There should be no need to employ skid porters after mechanisation of humping.
2. Functioning of retarders should be so efficient that there is no humping of wagons so that cases of detaching wagons in the departure yards due to mechanical unfitness are rare.
3. There should be no need for 'dressing' of wagons on marshalling lines.
4. There should not be any restriction on humping of any type of wagon or on the number of wagons in a 'cut'.
5. For efficient humping operations, facilities of cab signalling and radio communication on hump locomotives should be provided.

2.49. Mechanisation of humping not only increases wagon handling capacity of yards, but also provides an essential means for eliminating/reducing damage to wagons and their contents. On 31st March, 1982, there were 38 marshalling yards provided with humps on the Indian Railways, out of which humping operation had been mechanised only in ten. In view of the present as also the future pattern for moving traffic by block rakes, some of these yards are likely to become redundant so far as marshalling of wagons is concerned. The Railways should, therefore, make an assessment of the yards which would continue to have adequate load for marshalling of wagons. Humping operations in all such yards would require to be mechanised in a phased manner. We recommend that mechanisation of at least two yards should be taken up per year.

2.50. *Automatic Wagon Identification System*.—At present, when goods trains arrive in a yard, the individual number of wagons forming the train, are noted down by staff specially deputed for this purpose. This is a time consuming process and leads to detention of wagons because action for remarshalling the train can be taken only after the wagon numbers have been noted. In advanced countries, 'automatic wagon identification system', using cameras are installed, which automatically note the number of wagons and give a print-out while the train is entering the yard. We recommend that our Railways should also now provide this system in all major marshalling yards, with a view to cutting down detention of wagons. To begin with, these may be

\* This, in our opinion, is a compromise that eschews both scientific and economic approaches and shows only ad-hocism.



introduced in the ten major marshalling yards where humping has already been mechanised.

2.51. *In-motion Weigh Bridges.*—According to the present practice, wagons which require to be weighed are collected on a separate weigh-bridge line and are then weighed one by one. This procedure is very slow and involves considerable detention to the wagons. In-motion electronic weigh bridges are now available, which can speed up weighing operations considerably, thereby reducing detention to the wagons. We recommend that such electronic weigh bridges with automatic recording and print out of results should be provided in major yards\*.

2.52. *Efficient Telecommunication Facilities in Yards.*\*\*—Efficient telecommunication facilities play a vital role in speeding up yard operations. We, therefore, recommend that in major yards radio communication systems, comprising a "master-set" in the control tower and portable sets with field staff, should be provided. This would enable the yard supervisors and shunting staff in the field to communicate with one another, and thereby render yard working more efficient.

2.53. *Closed Circuit Television Facilities.*—Major marshalling yards are usually spread over a large area. Effective supervision of yard activities, therefore, poses a serious problem. Closed circuit television has now become an important aid in supervision of activities spread over large areas. This facility has been adopted by advanced Railway Systems and has greatly helped in speeding up yard operations. We recommend that closed circuit television should be provided for supervision of yard work in all the major marshalling yards†. To start with these may be introduced in the ten major yards where humping has already been mechanized.

2.54. *Electronic Interlocking.*—Interlocking devices used in signalling so far have been either of 'mechanical' or of 'electro-mechanical' type. Panel or route relay interlocking achieves interlocking by a 'sequential operation' of 'relays' which are also electro-mechanical devices. Recent advances in digital electronics have enabled development of micro-processor based electronic interlocking devices. Electronic interlocking devices have numerous advantages over relay type equipment viz. smaller size, lesser power consumption, easier maintenance, etc. Further, unlike relay interlocking, electronic interlocking is amenable to easy changes in interlocking systems whenever any modifications in yard lay-outs have to be carried out. With cheaper large-scale integrated circuits (LSI) in the offing and consequently the cost of micro-processors showing a continuous down trend, micro-processor based interlocking is likely to become the most cost-effective form of interlocking in the future.

2.55. We understand that a pilot project for electronic interlocking is undergoing trials on the British Railways. The Indian Railways should also keep themselves abreast with the technology of electronic interlocking so that advantage can be taken of the benefits offered by this system in the coming years.

### 3.0. Future Profile for Signalling.—

3.1. Having discussed the various modern signalling techniques, we now propose to delineate the future profile for signalling for the various categories of routes of the Indian Railways. We are quite conscious of the fact that our recommendations are not only extensive but also pervasive, so much so that these virtually amount to a range modernisation programme. While appreciating this factor, we must also simultaneously emphasise that the Indian Railways, in the interest of operational efficiency, can no more ignore the need for undertaking such a programme. The sooner the same is taken up for implementation, the better it is for operations and management as also for the system as a whole.

3.2. *Suburban Sections.*—Suburban sections are already the most intensively worked sections on the Railways. In the years to come, they are also expected to witness heavy growth in traffic density. By the turn of the century, these sections would be subjected to very high-tempo operations where speeds and safety would constitute the essence of train working. As trains would follow one another in quick succession, unaided human faculties would not be able to cope with the task of train regulation on these sections. A high degree of automation in train regulation would thus become essential not only for handling the heavy traffic density, to which these sections would be subjected, but for ensuring safety also. The signalling profile, by 2000 AD, for these sections should, therefore, be as under —

1. Such of the suburban sections which have not yet been equipped with multi-aspect colour light signalling should be provided with this facility.
2. At wayside stations, panel interlocking and at junction-stations/terminals, route relay interlocking should be provided.
3. Automatic signalling on all the suburban sections should be provided. Each individual line on the suburban sections should have the facility of by-directional train working.
4. On the suburban sections serving the metropolitan cities, computer-aided CTC should be provided. The CTC would include 'train describer system', which can be hooked up with the electronic display panels on the platforms at suburban stations, to exhibit arrival timings of various trains and also to enable pre-recorded announcements to be made in this connection.

For suburban sections, serving other major cities like Bangalore, Hyderabad, Pune, Ahmedabad, Lucknow, Kanpur, Nagpur, Bhopal Jaipur etc., where traffic would not be as intense as in the case of metropolitan complexes, centralised supervisory system,† equipped with micro-processor facilities for planning train movements, should be provided.

\* We have recommended in Part II of our Report that in colliery yards these should be provided by the collieries themselves.

\*\* This subject will be dealt with in detail in Chapter VII.

† The device will also help in detection and prevention of pilfer-

ages and other crimes in the yards where this is installed.

‡ This should have the facility of 'advance plotting of movements on dotted line which would disappear once a decision has been taken by the Controller about crossings/precedences.



5. For ensuring safety, continuous cab signalling should be provided for suburban networks serving Bombay and Calcutta only, where density of traffic is heavy. Cab signalling would have the facility of automatic application of brakes in case of non-obedience of danger aspects of signals by the drivers.

3.3. *Arterial Routes.*—Traffic density on these routes by the turn of the century would be very heavy. These routes would, however, mostly carry long distance 'mixed' traffic comprising passenger and goods trains. While passenger trains would mainly be super-fast inter-city trains, goods trains would be carrying trailing loads of 4,500/-, 7,500 tonnes, but would run at comparatively lower speeds. To deal with this mixed type of long distance traffic, such of the arterial routes, which have not yet been provided with double line tracks, should be provided with this facility. Depending upon the density of traffic, some of these routes might also need provision of third or even fourth track. Signalling profile for these routes by 2000 AD should be as under :

1. Multi-aspect signalling should be provided on all these routes. On the electrified sections or on those sections where reliable power supply is available, multi-aspect colour light signalling and on the remaining sections multi-aspect upper quadrant signalling, should be provided.
2. Panel interlocking at wayside stations and route relay interlocking at junction-stations/terminals, should be provided. Block working on the sections adjoining the stations, having panel interlocking, should be with the help of continuous track circuiting axle counters. This would obviate the need for installing LVCD at these stations. At such of the stations, for whose adjoining sections, it has not been possible to provide continuous track circuiting/axle counters, LVCD should be installed to enable automatic verification of complete arrival of trains.
3. Whenever need for splitting up long block sections arises for increasing line capacity, this should be done with the help of intermediate block signalling and not manned block huts. Existing block huts should be replaced by intermediate block signalling (IBS).
4. All major marshalling yards on these routes should be mechanised.
5. Since these routes would be carrying goods trains with very heavy trailing loads, safety devices like hot box detectors at the approaches of major yards as also at intervals of 100 kms., would be necessary. Other safety devices such as hazard detectors and automatic warning and stop system (AWS) should be provided depending upon the need of individual routes.

3.4 *Other main lines.*—Existing two-aspect signals on these routes should be replaced by multi-aspect signals. Panel interlocking at wayside stations and route relay interlocking at junction-stations/terminals, should be provided. Provision of hot box detectors/hazard detectors and AWS would depend upon the traffic density and speed of individual routes.

3.5. *Branch lines.*—These routes would continue to carry light traffic at comparatively low speeds. There would be no need for any major signalling inputs on these routes. Standard I signalling would, therefore, continue to be sufficient to meet the needs of the branch lines.

#### 4.0. Conclusions.

4.1. The 'arterial routes', comprising trunk routes and some of the main lines, are expected to witness a heavy growth in traffic density in the coming years. To handle this traffic growth, line and terminal capacity on these routes would need to be augmented substantially.

4.2. The remaining main line routes are also expected to experience growth in traffic but not to the same extent as the arterial routes. Line and terminal capacity on these routes would, therefore, not require to be augmented to the same degree as for the arterial routes.

4.3. Traffic density on branch lines is expected to remain light in the foreseeable future. No major inputs for these lines are, therefore, needed in the coming years.

4.4. The Railway Board have not framed any integrated plan for upgrading of signalling systems to cater to the above profile of traffic growth. As a result, improvements in signalling undertaken so far, have been sporadic, dictated more by crisis situations rather than in accordance with any well considered time-bound plan.

4.5. 'Token type' block instruments, used on single lines have numerous inherent deficiencies. Replacement of these instruments, on such of the trunk routes and main lines which are not likely to be doubled, whenever due, should, therefore, be done by 'tokenless' instruments.

4.6. Multi-aspect signalling has many advantages over the two-aspect lower quadrant signalling. It is, therefore, necessary that such of the stretches on the arterial routes which have not yet been provided with multi-aspect signalling, are equipped with this facility in the next five years. The remaining main line routes should also be provided with multi-aspect signalling in a further period of five years.

4.7. Whenever the need for splitting up of long 'block sections', on double line sections, for increasing line capacity arises, the Railways should, as a matter of rule, go in for IBS in preference to manned block huts. Existing block hut should be replaced by IBS on a time-bound programme.

4.8. All suburban sections, not only around the metropolitan cities but also those serving major cities like Lucknow, Kanpur, Nagpur, Ahmedabad, Pune, Bangalore, Bhopal, Jaipur etc., should be provided with automatic signalling.

4.9. Automatic signalling on trunk and main line routes, which carry 'mixed' traffic, comprising fast mail/express trains and slow passenger/goods trains, does not yield the same advantage as on the suburban sections. On such routes it would, therefore, be generally preferable to go in for a third track instead of automatic signalling for augmenting line capacity. The third track should be provided with signalling arrangements for due-directional working. The same approach should also be allowed when the need for the fourth track arises on account of further growth in traffic. It would, however, be desirable to carry out a cost-benefit analysis before taking an investment decision.

4.10. Automatic signalling may, however, be utilised to provide immediate relief in line capacity on short congested stretches on trunk routes and main lines, especially those located between important junction-stations.



4.11. On trunk routes and main lines, replacement of the existing two-cabin mechanical signalling should, in future, be done by panel interlocking only. On branch lines, however, panel interlocking is at present not necessary. Replacement of mechanical signalling on branch lines, whenever due, should, therefore, be by similar equipment. To meet this requirement adequate production capacity for mechanical signalling equipment should be vigorously developed.

4.12. Suburban sections deal with high tempo traffic in which fast trains follow one another in quick succession. On such sections, a high degree of automation is necessary not only for dealing with the extremely high intensity of traffic but also for ensuring safety. On suburban sections serving metropolitan cities, computer-aided CTC should be provided. On suburban sections serving other major cities like Lucknow, Kanpur, Nagpur, Ahmedabad, Secunderabad, Pune, Bangalore, Jaipur etc., centralised traffic supervisory system should be provided.

4.13. Out of the 38 major marshalling yards provided with humps, humping operations have been mechanised only in ten so far. In view of the present and future pattern of traffic movement in block rakes, some of these yards might not be required for performing marshalling functions in the coming years. The Railways should make an assessment and identify the yards which would continue to have substantial marshalling work in future also. All such yards should be provided with the facility of mechanised humping. At least two yards may be taken up for mechanisation per year.

4.14. There are other facilities such as 'automatic wagon identification system', 'in-motion weigh bridges', 'efficient telecommunication facilities' and 'closed-circuit television', which can considerably speed up yard operations. These facilities should not only be provided in the ten yards where humping has already been mechanised, but should also be made an integral part of all future yard mechanisation schemes.

4.15. The Railways should keep themselves abreast with the technological development that are taking place in the developed countries in regard to 'electronic interlocking'. This would enable them to take advantage, in the coming years, of the potentialities offered by the system.

4.16. Action should be initiated by the Railway Board to effect improvements in signalling on the 'suburban', 'arterial' and other 'main line' routes so as to attain, by 2000 AD, the profile suggested by us. Unless this is done, the Railway would not be in a position to efficiently handle the heavy traffic growth anticipated to materialise by 2000 A.D.

**Statement showing advantages (quantified) of Route Relay Interlocking at Ghaziabad.**

S. No.	Item	Figures prior to Route Relay Interlocking	Figures after Route Relay Interlocking
		Mts.	Mts.
1.	Average detention to incoming down locos for passenger trains.	40	20
2.	Average detention to outgoing locos in the ship siding at the east end.	45	20
3.	Average detention to outgoing locos to be attached with trains going towards Delhi.	25	25
4.	Average detention to transfer loads from Down Yard to Up Yard.	90	40
5.	Average detention to transfer loads from Up Yard to Down Yard.	90	30
6.	Average duration for which shunting engine is idle due to reception/despatch of trains (each one separately).		
	(a) YM Pilot	60	40
	(b) Down Yard Pilot	60	40
7.	Average detention to goods trains at adjacent station during grouping period (to be listed separately).		
	(a) Guldhar side	30	Nil
	(b) Mahrauli side	30	Nil
	(c) Maripat	30	Nil
8.	Duration for which marshalling/shunting is stopped for reception of Up Goods trains on Line/Nos. 38, 39, 40, 41, 42 & 43.	30	1

Note.—Prior to Route Relay Interlocking, Line Admission Book was sent by TD to the Yard Foreman. It was only after

nomination of the line, that TD ordered lowering of reception signals.



## CHAPTER IV

### SIGNALLING : MONITORING AND MAINTENANCE

#### 1.0. Introduction.

1.1. We mentioned in Chapter I that signalling not only constitutes an important aid to line capacity but also promotes safety in train operations. It is, therefore, necessary that all signalling and interlocking gears are maintained to a high standard. Due to various reasons, discussed by us hereinafter, the Railways have not been able to maintain these equipment in good condition. Consequently, the number of signalling and interlocking failures has been high. These failures have not only resulted in loss of line capacity, but have also adversely affected the very safety of train working, which is an important part of railway performance.

1.2. Efficient maintenance of signalling equipment, like that of any other machinery, primarily depends upon the availability of well trained and skilled staff, adequate supply of spares and tools of the requisite quality, sound maintenance practices and a well-defined system of intensive inspection of the equipment. In Part IX of our Report on PERSONNEL, we have already dealt with the subject of recruitment and training of staff, for the various departments of the Railways, including that of the signalling and telecommunication department. We propose to examine in this Chapter, each of the remaining items, with a view to identify the areas of weaknesses and suggest necessary corrective measures. Before doing this, we consider it necessary to give a brief review of the signalling and interlocking failures and the backlog of overhauling and replacement of signalling equipment that has accumulated over the years.

#### 2.0. Signalling and interlocking failures.

2.1. A review of signalling and interlocking failures, for the period 1966-67 to 1977-78, carried out by the Sikri Committee, had revealed that the incidence of failures per million train kilometres had increased from 72.9\* to 95.2\* during this period. The Sikri Committee had accordingly urged the Railway Board to take necessary steps to bring down the number of these failures. Year-wise number of signalling and interlocking failures, which occurred during the last four years, is given in Table 4.1.

Table 4.1  
Failures of signalling and interlocking gears\*\*

Year	Failure of signal and interlocking gears†	
	Number	Incidence per million trains kilometre
1978-79	39,536	84.31
1979-80	39,908	85.51
1980-81	41,804	89.48
1981-82	48,604	102.19

\* These figures exclude the signalling and interlocking failures on the Central Railway, for which necessary data was not available with the Sikri Committee.

\*\* Cf. Railway Board's letter No. 81/W3/SG/RRC/1, dated

2.2. We observe that after a decline during the years 1978-79 to 1980-81, the number of signal and interlocking gear failures per million train kilometres has further decreased to 102.19 during the year 1981-82.

2.3. The Sikri Committee had also observed that the statistics of signalling and interlocking failures, maintained by the Railways, did not reflect the true picture, since all the failures were not being recorded. For instance, at such of the stations, where a signal maintainer was available round the clock, station masters were generally not recording, in the 'signal failure registers', all failures which took place at these stations. Instead, many of these failures were being attended to, on oral instructions from the signal maintainers. Since a record of signal failures would help the administration to analyse the causes, with a view to take remedial measures, that Committee considered it essential that not only the signal failures were faithfully recorded, but also that such records were cross-checked to ensure their accuracy. Our study of this problem reveals that this position has not altogether changed. A number of signal failures still do not find their way into the records. Necessary steps should be taken by the Railway Board to ensure that all signalling and interlocking failures are faithfully recorded.

2.4. Most of the Zonal Railways do not have a system of analysing the signalling and interlocking failures with a view to determining the inadequacies in the system and taking remedial measures. In this context, the Sikri Committee had noted that the Railways were reviewing only such of the failures which affected 'important' trains. Even in these cases, the review was merely confined to making a statistical summary of the failures for assigning responsibility and after obtaining the explanations, howsoever inept, the occurrence was forgotten. As a result, 'repeated' failures of the same nature continued to occur, seriously affecting the train operations.

2.5. We attach great importance to a scientific analysis of signalling and interlocking failures. Such an analysis enables the administration to identify the deficiencies in the system that led to these failures. We, therefore, recommend that the Railways should carry out an analysis of 'all' signalling and interlocking failures and not merely those which affect important trains. Further, such an analysis, to be meaningful, should be carried out in respect of each station, not only gear-wise, but also operator/maintainer-wise. The result of these analyses, indicating the causes of failures and the measures which could have prevented them, should be circulated to all maintenance staff. Such a course of action would go a long way in reducing the number of failures.

2.6. The Sikri Committee had noted that the Railways had made no attempt to correlate failures with the

11-8-1983. These figures exclude block instruments and track circuit failures.

† As discussed in paragraph 2.3, these statistics do not reflect the true picture : the actual No. of signalling and interlocking failures is much higher than these figures.



density of traffic and the population of signalling gears. In the absence of such a correlation, it has not been possible to judge, on a quantitative basis, the efficiency of the state of maintenance of the equipment. We would, therefore, wish to stress what the Sikri Committee had recommended, that some norms, correlating signalling and interlocking failures with traffic density and the population of signalling gears, should be laid down for judging the efficacy of the system.

### 3.0. Track circuit failures.

3.1. Since track circuits are an important aid to safety, it is necessary that their failure rate is reduced to the minimum. Most of the track circuit failures are caused by :

1. Poor maintenance of track circuit equipment like batteries, rectifiers, etc.
2. Failures of insulated rail joints.
3. Flooding of tracks, in the rainy season.
4. Thefts of materials like relays, batteries, etc.
5. Activities of miscreants who cut 'bond' wires and track circuit 'leads'.

3.2. Track circuit failures, year-wise, for the last five years, are given in Table 4.2.

Table 4.2

Track circuit failures*		
Year	No. of track circuit failures	No. of stations provided with track circuiting
1977-78	5,834	1,926
1978-79	5,619	2,032
1979-80	4,675	2,157
1980-81	5,405	2,246
1981-82	5,593	2,305

3.3. It would be seen from this table that whereas the number of stations having track circuiting increased from 1,926 to 2,305 (19.68) percent during the quinquennium 1977-78 to 1981-82, the number of track circuit failures decreased from 5,834 to 5,593 (4.1 percent) during this very period. Though this is a welcome development, the number of track circuit failures, in absolute terms, still continues to be high.

3.4. Track circuits are not only essential for efficient working of modern signalling installations like panel/route relay interlocking, automatic block system and centralised traffic control, but are also an important aid to safety. We would, therefore, urge the Railways to make all possible efforts to further bring down the number of track circuit failures. Towards this end we recommend the following :-

1. Maintenance of track circuits equipment like batteries, rectifiers, etc., should be improved.

2. Insulated rail joints should be replaced by 'glued joints', which are more reliable, have a longer service life and are less prone to failures. A higher priority in this regard, should be allotted to stations on trunk routes which carry heavy traffic density.
3. Drainage in the yards should be improved so that flooding of tracks in the rainy season, which reduces ballast resistance and leads to track circuit failures, is minimised or completely eliminated.
4. Sustained efforts should be made with the help of RPF and the local police to check pilferage of track circuit equipment and other miscreant activities.

### 4.0. Overhauling of lever frames and block instruments

4.1. For efficient maintenance and operation, lever frames and block instruments are required to be periodically overhauled. As per the present norms, overhauling of lever frames is to be done once every three years and of block instruments once every ten years. Year-wise position, for the last five years, in respect of overhauling of these equipment, is given in Table 4.3.

Table 4.3

Overhauling position for lever frames and block instruments†

Year	Shortfall in overhauling of lever frames	Shortfall in overhauling of block instruments
1977-78	664	336
1978-79	733	236
1979-80	890	410
1980-81	681	233
1981-82	495	201

4.2. The shortfall in overhauling of lever frames after having risen to 890 during 1979-80 has been showing a decreasing trend thereafter. In the case of block instruments also, except for the year 1979-80, there has been a continuous down trend in the arrears of overhaul. Though this is also a welcome development, in absolute terms, the backlog in overhaul of both lever frames and block instruments is still considered to be high. Since this backlog has serious repercussions on safety, it has been subject-matter of adverse comments from the Commission of Railway Safety. In this context, an extract from their Report, for the year 1981-82, is reproduced below :

"Lever frames and station master's control frames had not been overhauled in due time at many stations on the Eastern Railway and this, in fact, had become a chronic feature on that Railway. Such instances came to notice on the Western Railway as well—Alwar junction and other stations of Jaipur Division."

\* Cf. Railway Board's letter No. 81/W3/SG/RRC/1, dated 3 August 1983. The figures do not, however, appear authentic and on the basis of figures collected by us, these appear to be under-stated.

† Cf. Railway Board's letter No. 81/W3/SG/RRC/1, dated 3-8-1983. The figures appear under-stated.



4.3. The main reasons attributed for the backlog in overhauling of lever frames/block instruments are as under :—

1. Reluctance on the part of the traffic department to permit overhauling programmes, since this involves abnormal working in yards, resulting in a slow-down of train movements and employment of additional ASMs/Pointsmen.
2. Non-availability of specific 'time allowance' in the time-table for such overhauling works.
3. Very long periods, needed for overhauling. This is due to the general practice of doing overhauling only in a single shift of eight hours during day time, instead of two or three shifts. On this account the overhauling of bigger lever frames sometime gets spread over a period of up to six weeks. This unnecessarily prolongs the abnormal working in yards where this overhauling is undertaken and becomes a further cause of reluctance on the part of the traffic department to permit such overhauling.
4. Absence of special staff with the traffic department for undertaking overhauling works of this nature. As a result, the traffic department has to divert ASMs/Pointsmen for overhauling works from their normal leave reserve/trainee reserve strength. Since very often the strength of leave/trainee reserve staff is also depleted, it becomes difficult to arrange ASMs/Pointsmen for overhauling works.

4.4. We also understand that in respect of overhauling of lever frames, the Railways have not issued any technical instructions. In this context, an extract from the report of a 'working group' on signalling and telecommunication, set up by us is given below :—

"It is also observed that no standard circular has been issued either by Railway Board or by RDSO or by any individual Railway, indicating what data is to be collected on a lever frame and its locking box, before overhauling is undertaken. The present overhauling is more of an adhoc nature than a pre-planned and pre-organised project, whose various requirements have been finalised in great detail. The standard practice is for taking out the lever frames for overhauling and then examining what are the various aspects to be dealt with. Occasions of inspectors running about for materials, after the commencement of overhauling, are not few and far between. This unnecessarily prolongs the period of overhauling leading to hastening of the work at the last stages and results in a considerable sacrifice in the quality of work. In fact, ignorance regarding the defects to be looked for in any frame, due for overhauling, is also not rare. This state of affairs is only a result of lack of education in the training schools, lack of guidance on the part of the top management and to a certain extent lack of interest on the part of the supervisory staff."

4.5. Further, the frequency of overhauling of 'all' lever frames has been laid down as once in three years.

This is irrespective of the consideration whether the lever frames are of 'catch handle' or of 'direct locking' type, and whether they are to be used on routes having heavy or light traffic density.

4.6. To overcome the above problems and to wipe out the backlog of overhauling of lever frames and block instruments, we recommend ;

1. Frequency of overhauling of lever frames should be fixed taking into account (i) density of traffic, and (ii) type of lever frames viz., whether the lever frames are of catch handle type or of direct locking type.
2. Detailed technical instructions should be issued by the Railway Board to provide guidelines about the data that should be collected on the lever frames and their locking boxes, before these are taken out for overhauling.
3. Overhauling of lever frames/block instruments, should be undertaken in atleast two shifts.\* The strength of overhauling gangs should be based on this consideration.
4. The programme for overhauling of lever frames and block instruments should be streamlined. At the beginning of each year, a detailed overhauling programme should be framed by the signal and telecommunication branch, in consultation with the traffic branch. Adequate time allowance for this overhauling programme, should be provided in the working time-tables. It should be possible to undertake overhauling of lever frames atleast on one section on every Division at a time.

#### 5.0. Overhauling of Relays.

5.1. These are two types of relays presently in use on the Railway : 'shelf' type and 'plug-in' type. Shelf type relays are required to be overhauled periodically\*. Overhauling of these relays is done in the signalling workshops. For this purpose, they are taken out from the circuits at the stations and are replaced by spare relays. Overhauling of relays has, however, also gone into arrears. In this context, an extract from the Report of the Commission of Railway Safety for the year 1981-82, is reproduced below :

"Delays in the periodic overhauling of relays and periodic testing of cables was another omission which was widespread. Apart from most stations on the Eastern Railway, the schedules were out of gear even on some important junction stations, such as Tundla, Delhi Main and Varanasi (MG), on the Northern Railway."

5.2. Arrears of overhauling of relays have arisen mainly due to shortage of relays and the difficulties involved in the replacement of shelf type relays. Against an yearly requirement of about 45,000 of both shelf and plug-in type relays, the actual availability, till recently, has been less than half of this figure. Relays are presently manufactured by (i) Railways' own signalling workshop at Podanur on the Southern Railway, (ii) a private firm at Bombay, and (iii) a joint sect or firm at Calcutta. Production capacity of each of these three

\* These shifts should be from 06.00 to 14.00 hours and 14.00 to 22.00 hours.

\*\* Periodicity of overhaul is once in ten years for track relays and

once in 15 years for line relays. For plug-in type relays no periodical overhauling is necessary. Instead, periodical checking is done and where a relay is found to be malfunctioning it is taken out and sent to workshop for repairs.



sources has been considerably expanded recently and the total production of relays is now adequate to meet the entire requirement of the Railways. We hope that the Railways would take full advantage of the easy availability of the relays and make all efforts to wipe out the overhauling arrears in the shortest possible time.

5.3. The difficulties in the replacement of relays, applies only to shelf type relays. Replacement of shelf type relays involves disconnection of the existing wiring and its reconnection after the new relays are inserted in the circuit. During the interval, disconnection of the old relays and reconnection of the new ones is in progress, signalling equipment has to remain out of working order. Replacement of relays at the stations has, therefore, to be undertaken only during the intervals when there are no trains and under the supervision of a signal inspector. In the case of plug-in type relays, there is no such difficulty. These relays can be easily taken out and new ones immediately 'plugged in'. This difficulty can, therefore, be overcome by replacing, in a phased manner, the existing shelf type relays by the plug-in types.

5.4. We have been informed that while there would be no problem in following this course of action, in the case of relays provided in indoor locations, this approach would not be feasible in the case of relays in such of the out-door locations as are subject to induction effects from AC traction equipment. This is on account of the fact that the plug-in type relays presently being manufactured within the country are prone to high induction effects. It is, therefore, necessary to further improve the design of plug-in type relays so that they are suitable for all out-door locations also. Thereafter, all shelf type relays can and should be replaced by plug-in type relays.

#### 6.0. Maintenance practices.

6.1. There are a number of deficiencies in the existing maintenance practices which, if overcome, can considerably reduce the incidence of signal and block instrument failures. These deficiencies, together with our suggestions for overcoming them, are discussed hereinafter.

6.2. *Testing of signal cables.*—A number of signal failures occur due to loss of 'insulation' either between one conductor to another in the cable itself or between a conductor and the earth. Insulation of the signal cables, is, therefore, required to be tested annually. We have been informed that testing of cables is presently not being done due to lack of a suitable means to carry out such testing without interrupting traffic. The present method, known as 'meggering'\* of cables requires disconnection of cable from the signalling equipment, before insulation testing can be undertaken. Insulation testing by meggering is not only time consuming but is also impracticable especially on routes carrying heavy density traffic. We understand that for insulation testing, advanced Railways abroad use devices known as 'earth leakage detectors'. With the help of these devices it is possible to carry out insulation tests, from one conductor to another as well as from conductor to earth, without disconnecting the cable from the signalling equipment. If a particular conductor shows loss of insulation, it can be disconnected from the circuit and attended to later, after using a spare conductor in its place. We, therefore, recommend that the Railways

should also use earth leakage detectors for conducting insulation tests for cables. Further, at those stations where cables do not have spare conductors, extra cables should be laid to provide spare conductor so that in the case of a conductor having been found to have lost insulation, it can be disconnected and a spare conductor used in its place.

6.3. *Visibility of signals.*—It was brought in evidence before the Sikri Committee that visibility of colour-light signals in certain areas is poor during day time, particularly on the east-west alignments, due to the glare of the sun, or due to low voltage, or because of voltage fluctuations. To improve signal visibility, the Sikri Committee had recommended the use of :—

- (i) automatic voltage stabilisers.
- (ii) higher voltage bulbs of 33 watts instead of 25 watts.
- (iii) improved design of double lenses, production of which has recently commenced, and
- (iv) power supply from OHE instead of from local supply.

In the interest of improving visibility of colour-light signals, we strongly suggest that the Railway Board should expedite implementation of these recommendations.

6.4. Further, the existing instructions, which lay down that electric bulbs should be lit up in workshops of signalling inspectors for two hours before they are actually installed at site, so that they get debugged fully, should be scrupulously followed.

6.5. *Fuses.*—Signalling installations presently employ 'fuses' of the 'cartridge' type. These fuses not only have certain inherent deficiencies, but it is not possible to immediately detect their failure since the failures are not of 'indicating' type. Non-replacement of 'blown off' fuses, leads to break in the electric circuit, resulting in signal failures. Some of the Zonal Railways have attempted to overcome this problem by replacing these fuses at regular intervals, even when they have not blown off. We do not consider this to be a satisfactory arrangement. We have been informed that there can be two possible solutions to this problem. Either fuses, whose failures are of indicating type, which are now available, can be employed or they can be replaced by MCBs.\*\* The Railway Board should evaluate relative merits and demerits of the use of fuses having failures of indicating type and MCBs. Whichever of these alternatives is found better, should be adopted in lieu of the existing cartridge fuses.

6.6. *Power supply systems.*—Power supply for signalling equipment is provided through batteries. It is understood that the Railways have not standardised power supply systems for different types of signalling installations; no study seems to have been made regarding the capacity of batteries required for various purposes. As a result, power supply arrangements vary from one installation to another depending upon the judgement and initiative of the individuals in-charge of installing and maintaining these installations. With the consequent proliferation of batteries of various types, their maintenance suffers, resulting at times in failures of the signalling equipment.

\* In this method, resistance of the individual conductor in the cable or the cable as a whole is measured, by disconnecting them from the circuit.

\*\* Miniature Circuit Breakers.



6.7. We, therefore, recommend that this problem should be looked into by the Railway Board and necessary instructions for standardising the power supply arrangement for various types of signalling installations issued. In the case of wayside stations, where requirement of power for signalling installations is small, a long-term solution to the above problem might be the use of solar cells. We understand that the Railways have provided, as a trial measure, solar cells for operating signalling equipment, at one or two stations. If these trials show promising results, use of solar cells or operating signalling equipment should gradually be extended to cover all wayside stations.

6.8. *Panel/route relay interlocking installations.*—For safety of train working, the interlocking feature of signalling installations is required to be periodically tested. However, whereas testing of interlocking feature in the case of lever frames, at certain intervals, has been stipulated in the Indian Railways Signal Engineering Manual, no such specific stipulation exists for panel/route relay interlocking installations. As such, testing of interlocking in panel/route relay interlocking installations is done either at the time of its initial commissioning or whenever any alterations to these installations have to be carried out. We recommend that this issue should be examined by the Railway Board and periodicity for checking of interlocking feature of such installations should be laid down, as for lever frames.

6.9. *Short-cut methods of signalling staff.*—It was brought to the notice of the Sikri Committee that 'short-cut' methods were being frequently adopted by the signalling staff in their maintenance work, particularly while rectifying signal failures. This sometimes even led to accidents. In this context, the Sikri Committee had observed : "the 'looping' or 'bridging' of relays under conditions of failure of a signal, point, or track circuit, by signal staff, either individually or jointly with traffic staff, is undesirable practice, fraught with serious consequences and should be prohibited under rules". The Sikri Committee had accordingly recommended that, where any 'sectional release' was required in the interest of train operation, technical solutions like provision of 'calling-on' signals and 'emergency cancellations switch' should be employed, with built-in safeguards for safe movement of trains. We endorse this recommendation of the Sikri Committee and suggest that the Railway Board should implement it.

6.10. *Directed maintenance system.*—The present system of maintenance of signalling gears on a section, once in a fortnight by a signal maintainer and once in a month by the sectional signal inspector, was evolved decades ago when rail traffic was light and signalling equipment was much simpler. Availability of traffic blocks for maintenance of signalling gears at that time posed no problem. With heavy increase in rail traffic and the consequent multiplication of signalling equipment, it is difficult to get adequate number of traffic blocks. It is also no longer possible for the signal maintainer to tackle a wide variety and type of signalling equipment, all by himself. This situation becomes more difficult on suburban sections which have very heavy traffic density and have been provided with panel/route relay interlocking installations. To overcome these problems the Railways have introduced a system of 'directed maintenance' on some of the suburban sections. Under this systems, the sectional signal inspector with a team of maintainers and other artisan staff, undertake maintenance of a large number of signalling equipment,

spread over a big area in a yard simultaneously, by taking a common traffic block. Each member of the team carries out maintenance of equipment assigned to him. The sectional signal inspector not only supervises the maintenance work done by each individual but also gives necessary technical guidance on the spot, which ensures better quality of work. On busy suburban sections such directed maintenance is generally undertaken during night hours. We recommend that the system of directed maintenance should be gradually extended to all heavy density routes.

## 7.0. Stores.

7.1. Nearly 800 items of stores are used in signalling installations, about 300 of them for mechanical and the balance for electrical signalling installations. Efficient and proper maintenance of signalling installations depend, to a large extent, not only on the quality of the stores procured but also on their timely supply. In view of the critical importance of material management, we propose to deal with this subject exhaustively in one of our subsequent Reports. At this stage, with a view to improving maintenance of signalling equipment, we would like to emphasise only the following points.

1. Quality of spares to be procured should be of a high order. For this purpose, procurement of stores should normally be arranged only from those firms which have been approved by RDSO. Instructions for this already exist but are not being rigidly followed. We recommended that this should be done.
2. The store depots on the Railways should stock adequate quantity of items required for maintenance purposes. The quantities to be stored depend upon the frequency in which these items are likely to be required on the basis of normal wear and tear and should be worked out annually by each Zonal Railway. We understand that instructions for this also exist but are not being followed. We recommend that such an exercise must immediately be undertaken to ensure timely and adequate availability of these items in the store depots and the stocks should be updated annually.
3. We understand that certain signalling items like 'point machines', 'signal motors', 'colour-light signals', 'electrical detectors', 'lever frames' etc. are stocked only as complete assemblies, in the store depots, whereas for most of them for maintenance purposes, only certain parts are needed. We recommend that various parts of these items required for maintenance should also be stocked in the store depots.

## 8.0. Inspection/Maintenance schedule.

8.1. The Indian Railways Signal Engineering Manual specifies that the signalling equipment at stations or in block cabins, should be inspected :

1. Once a fortnight by the 'Signal Maintainer'.
2. Once a month by the 'Sectional Signal Inspector'.
3. Once in three months by the 'District Signal Inspector'.\*
4. Once in a year by a gazetted officer of the signalling and telecommunication department.

\* Jointly with the Traffic and Loco Inspector.



8.2. These provisions were laid down when this manual was first published in 1955, when signalling branch on most of the Divisions was headed by officers in 'junior scale'. Further, these stipulations mainly catered for the requirement of conventional type of mechanical signalling. Over the years, traffic density on many routes has increased considerably. Mechanical signalling has also given way, to a large extent, to modern electrical signalling. There has also been rationalisation of the jurisdictions of the signal inspectors. On most of the Divisions Senior DSTE\* or DSTE's are now heading the signalling branch and are assisted by two or more ASTE†.

8.3. In view of the above, the Wanchoo Committee recommended that inspection of signalling equipment at stations or in block cabins should be intensified. The Sikri Committee, while reviewing this recommendation ten years later, observed that "no efforts appear to have been made towards intensification of inspections by inspector and officers".

8.4. Apart from the inadequate periodicity of inspections, the basic lacuna in the present practices is that no distinction has been made regarding the details of works to be done by a maintainer, a sectional signal inspector, by a district signal inspector and by a gazetted officer. Each one of these officials is expected to 'inspect' — a term which generally implies testing 'fail safe feature' of the signalling equipment. No detailed instructions have been issued covering the following aspects :

1. What are the specific items of maintenance which should be carried out by the maintainer for preventing failures, how potential failures should be recognised/diagnosed and what action should be taken to prevent them.
2. Methods for measuring tolerances of the various moving parts of the signalling equipment and laying down the maximum tolerances beyond which re-adjustment of the equipment is called for.
3. No periodicity has been laid down for overhauling of vital items of signalling equipments such as 'point motors', 'signal motors', 'lever locks', 'electrical reversers', 'electrical detector', etc.

8.5. We recommend that not only the inspection of signalling equipment should be intensified, but the details of work to be done by the various officials should be clearly specified. Also, periodicity of overhauling of the item of equipment mentioned above, should be laid down.

8.6. At present, a sectional signal inspector goes out for 'inspection' without any reference to the programme of maintainers under his control. There is no system by which the sectional inspector can ascertain the actual work done by the maintainers to satisfy himself regarding the quality of this work and also to guide the maintainers whenever they need such guidance. Thus, the sectional inspectors work, and the maintainers work are uncoordinated. We recommend that suitable instructions should be issued to overcome this drawback. The district signal inspectors, inspection also suffers from the same drawback as that of the sectional signal inspector. This should also be rectified.

8.7. Regarding the maintenance schedule periodicity, we consider that, to make a maintainer to look into all items of maintenance of equipment every fortnight, a sectional signal inspector every month and so on, is neither necessary nor productive. Every item of equipment is not required to be inspected every fortnight. Certain items require checking once in a fortnight while others once in a month and so on. It is, therefore, necessary to have a detailed schedule to be drawn up for each item of equipment which should take into account the density of traffic on the route on which these equipment have been provided. Unless such an exercise is done and specific responsibility given to the various categories of staff, no worthwhile result would be achieved by having merely a so-called 'inspection', which, to our mind has degenerated into a only routine ritual. Therefore, issue of detailed maintenance circular is necessary which should indicate not only the periodicity of inspection/maintenance of individual items but also a step by step procedure for evaluating the performance of these items, with a view to diagnosing the need for any further remedial action. A set of instructions should also be issued indicating the aspects of neglect of maintenance or adjustments which can lead to lack of safety. This is a very important technical check which will enable the signalling equipment to be maintained so that failure if, any, is on the 'safe side'.

8.8. Responsibility for 'initial' maintenance at different levels should also be decided upon. For instance, initial maintenance of certain equipment which are highly sophisticated, should be done at the level of only district signal inspectors and those less sophisticated at the level of sectional signal inspectors and so on. Once the responsibility for initial inspection has been clearly spelt out, the present tendency of every body to 'supervise' and only the lowest grade of signal maintainers to do the actual work of maintenance without a complete check by higher and technically better qualified authorities would be avoided.

## 9.0. Signal Engineering Manual.

9.01. The present Signal Engineering Manual, by and large, is more a statutory document than a maintenance manual. While it lays down, in detail, periodicity of inspection by various officials, frequency of overhauling of lever frames/block instruments and certain principles of interlocking, detailed maintenance instructions are not contained in this manual, or are inadequate or summarily cover only a few items. The Manual, at present, merely supplements the 'General and Subsidiary Rules' and the 'Rules for Opening of the Railways'. It is cluttered with provision of 'General Code' and the 'Engineering Code'. In short, in the present Signal Engineering Manual, an attempt has been made to include in a single book, all statutory regulations, periodicity of inspections, accounting procedures, etc. to be followed by the officials of the signalling department. Technical details of the various maintenance schedules to guide the maintenance staff, are conspicuously absent.

9.2. There is another set of instructions issued by the Railways in respect of installation and maintenance of signalling equipment on sections provided with 25 KV AC electrification. This set of instructions was initially issued by the Railway Electrification Organisation and is also some time referred to as RE Manual. The RE Manual, as it stands today, has also left a number of gaps, particularly in respect of situations



faced in major yards and panel/route relay interlocking installations as well as in electro-mechanical installations using point motors/signal motors. Evidently, the RE Manual was initially prepared more to cater to situations at wayside stations. Further, this Manual also suffers from the same drawback as the Signal Engineering Manual in as much as it contains more of statutory regulations than any guidelines for maintenance.

9.3. It is understood that copies of the Signal Engineering Manual or the RE Manual are so scarce that they are not available even with Signal Inspectors and certainly not with most of the Signal Maintainers. The result is that even the few guidelines for day-to-day maintenance, contained in these manuals, have not reached the grassroot level. We, therefore, recommend that the Railways should arrange for a revision of these manuals. The revised versions should contain detailed instructions to serve as guidelines for the various maintenance schedules. Adequate copies should be printed and supplied to every official connected with signalling installation right down to the maintainers level.

#### 10.0. Conclusions.

10.1. Due to various reasons, the Railways have not been able to maintain the signalling equipment in good condition. As a result, the number of signal failures, in absolute terms, still continues to be high.

10.2. A number of signal failures, especially at those stations where a signal maintainer is available round the clock, do not find their way into records. As a result, statistics of signal failures being maintained by the Railways, are not realistic. This situation should be rectified.

10.3. The number of track circuit failures is also high. Track circuit failures should be brought down by (i) improving the maintenance of track circuit equipment, (ii) providing better drainage in the yards, (iii) replacing insulated joints by 'glued joints', and (iv) undertaking a sustained drive with the help of the RPF and the local police to check pilferage of track circuiting equipment and other unlawful activities.

10.4. Overhauling of lever frames and block instrument has gone into arrears. These arrears should be eliminated and action taken to ensure that they do not accumulate, by undertaking overhauling of these equipment in two shifts and making available adequate time allowance in working time-tables for these overhauling schedules.

10.5. To improve the quality of overhauling works, adequate arrangement of spares and issue of detailed technical instructions for the guidance of the staff, should be undertaken.

10.6. Frequency of overhauling of lever frames should be re-fixed, taking into account the density of traffic and the type of lever frames.

10.7. Overhauling of relays is also in arrears. This is mainly due to inadequate availability of relays. Since relays are now available in adequate quantity, these arrears should be wiped out expeditiously.

10.8. Replacement of shelf type relays is time consuming and difficult as it involves disconnection/reconnection of wiring. This difficulty can be overcome if 'shelf' type relays are gradually replaced by 'plug-in' type of relays. However, shelf type relays are superior to 'plug-in' types in regard to induction effects. Before replacement of shelf type relays by plug-in types is undertaken, design of the latter should be improved so that they have similar characteristics with regard to induction effects as the shelf type relays.

10.9. Visibility of colour-light signals during day light hours particularly on east-west alignments should be improved by taking the steps recommended.

10.10. The existing 'cartridge' type fuses are unsuitable for use in signalling circuits. Two alternatives are available to the cartridge type fuses : (i) 'miniature circuit breakers' and (ii) 'indicating' type fuses. The Railway Board should examine replacing the existing cartridge type fuses by either MCB or indicating type of fuses, depending upon their comparative merits/demerits.

10.11. Power supply systems for signal installations should be standardised.

10.12. Periodicity for testing of interlocking feature for panel/route relay interlocking should be laid down.

10.13. Adequate and timely arrangement for spares of proper quality should be made for signalling equipment so that maintenance of signal installations does not suffer on this account.

10.14. A set of instructions should be issued by the Railway Board, indicating the aspects of neglect, maintenance, or adjustments which can result 'unsafe failures' of the signalling equipment.

10.15. Responsibility for initial maintenance of the signalling equipment by various levels, should be clearly specified.

10.16. The present Signal Engineering and RE Manual are more of statutory documents than maintenance manuals. They should be revised to give more technical details about the maintenance of the equipment.



## CHAPTER V

### TELECOMMUNICATION : GENESIS AND GROWTH

#### 1.0. Introduction.

1.1. Telecommunication is an essential input for operating a rail transport system. The Railways require telecommunication facilities not only for controlling and monitoring day-to-day train movements, but also for many other co-ordination and control functions. These include : collecting basic data from activity centres like stations, marshalling yards, interchange points, goods sheds, parcel offices, etc., for planning train movements ; giving instructions to these centres for deployment of rolling stock, motive power and crews ; and transmitting data in respect of passenger reservations, meal messages and other customer services.

1.2. Telecommunication is not only essential for operating the Railways, but also constitutes a vital means for improving their productivity. Advanced Railway Systems abroad are increasingly adopting telecommunication-based techniques, like computerised freight operation and passenger reservation, for handling larger volumes of traffic, improving the quality of service and stepping up the system efficiency.

1.3. The World Bank, while appraising the working of the Indian Railways in connection with the grant of a loan for their modernisation projects, had, in 1980, expressed a similar view\*. It had stated that benefits of the improved telecommunication-based management techniques outweigh the advantages which can be gained from the additional capacity augmentation investments in the Railways†. Taking a typical case of investment on telecommunication-based operation information system (OIS) vis-a-vis procurement of modern rolling stock/locomotives for the purpose of comparison, the Bank had pointed out that whereas a comparatively smaller investment on the former would result in benefits like reduced wagon turn-round period, improved utilisation of rolling stock/locomotives, increased revenue and better customer services, not many additional modern rolling stock/motive power could be purchased with the same amount. Investments on telecommunication-based management techniques lead to intensive utilisation of the existing assets and are thus more cost effective.

1.4. Considering their diverse activities, geographical extensiveness and complexity of operations, the Railways requirements of telecommunication are highly specialised and unique. The Organisation operates every day about 11,000 trains over 61,230 route kilometres, served by 7,072 railway stations, to carry over ten million passengers and 6.5 lakh tonnes of freight traffic. The inputs for handling such a large volume of traffic are provided by numerous activity centres-over 440 traffic yards, 350 locomotive sheds, 400 carriage and

wagon depots, 49 rolling stock overhauling workshops, etc. For planning and controlling traffic, the Railways have, therefore, to rely on an elaborate telecom network inter-connecting these activity centres.

#### 2.0. Telecom facilities needed by the Railways.

2.1. Telecom facilities on the Railways can be broadly classified into two categories : (i) those which are directly connected with train working, and (ii) those which are used for control/co-ordination functions and data transmission. The former comprise 'block circuits' and 'control circuits' and the latter, direct telephone/teleprinter/telegraph circuits.

2.2. 'Block circuit' on a section is the communication channel which connects every station to the adjoining ones and is used by station masters for the purpose of block working, i.e. obtaining or granting 'line clear' for despatch or reception of a train. Control circuits‡ are omnibus circuits, and connect the 'control office', to each station on the various sections, falling within its jurisdiction. 'Train controller's, from the 'control office', by establishing contact with the stations under their charge, regulate running of trains, by arranging 'crossing and precedences'.

2.3. Since trains generally traverse a number of Divisions and Zones, a continuous coordination has to be maintained amongst them. This is done with the help of direct telephone circuits provided between the Zonal and Divisional headquarters as well as other important stations. Direct telegraph circuits also exist between the Divisional headquarters and other important stations, yards, etc. for transmitting reservation and other service messages. The Morse Telegraph Instruments on some of the important circuits, have been replaced by teleprinters.

#### 3.0. Growth of rail telecom network.

3.1. *Line wire alignments.*—During the early stages, the Railways primarily used land line communication system, whether for block/control circuits or for direct telephone/telegraph circuits. Except for a few wireless circuits which were provided by the Railways on certain hilly sections due to the vulnerability of land line wires in these areas, or to cater for emergencies, all the other circuits were taken on lease by the Railways from the P&T Department. This arrangement met the needs of the Railways upto the Forties, as the rail traffic was generally light and not much coordination was required for train operations. Moreover, since the pressure from the general public on P & T Department's trunk circuits was not heavy, the Railways were normally able to get their trunk calls without delays.

\* Aide Memoire, World Bank Railway Mission, April 1980.

† In our view, this is a very apt and relevant comparison as a marginal rise in the investment on signalling and telecommunication, particularly telecommunication, tones up the efficiency of performance of the system substantially and proves a vital aid to management.

‡ These are 'section control' and 'deputy control' circuits. These circuits are provided with the facility of 'selective calling' to enable 'section controllers' and 'Deputy Chief Controllers' to 'call any station of their choice. On electrified sections a few additional circuits such as 'emergency control', 'traction power control (TPC)', and 'traction loco control (TLC)', etc. have also been provided.



3.2. With the rapid growth in rail traffic from the Fifties, the need for additional control circuits to handle the increased traffic as well as for a substantially larger number of direct telephone/telegraph circuits, was felt by the Railways. The P & T Department, owing to the competing pressure for provision of telecommunication facilities in the civilian areas, which were also developing fast, was not able to meet the Railways demand for additional circuits. We have also been informed that the P & T Department was not willing to provide the Railways with additional point to point 'carrier channels' on the control circuits hired from them. The Railways need for additional control circuits, therefore, largely remained unsatisfied. There was also a heavy pressure from the general public on the P & T Department's trunk telephone service, as a result of which the Railways trunk calls started suffering considerably longer delays. This adversely affected train operations since 'real time' coordination between the various activity centres, which depended on these trunk calls, become difficult.

3.3. At this stage, the Railways also noticed a marked drop in the performance of the circuits taken from the P & T Department. The main causes for the low efficiency of the P & T circuits were large scale thefts of copper wires, non-replacement of old and worn out alignments, lower priority for restoration of Railway circuits and no system of rectification of faults at night. Performance of the control circuits on several sections deteriorated to such an extent that controlling of train movements became extremely difficult. Frequent and long interruptions on these circuits slowed down traffic resulting in under-utilisation of the costly assets. An instance in this connection is the performance of P & T circuits on Rangapara North—North Lakhimpur—Markonz Selekt-section\* of the Northeast Frontier Railway, whose performance for the last four months of 1977 is given in Table 5.1.

Table 5.1

**Performance of P & T circuits on Rangapara North-North Lakhimpur-Markonz Selekt section of Northeast Frontier Railway.**

Details of P & T circuits	Average performance			
	September 1977	October 1977	November 1977	December 1977
1. Section Control Circuit.	80.5%	59.3%	43.5%	38%
2. Deputy Control Circuit.	68.9%	42.8%	18.6%	31.5%

3.4. The poor performance of the control circuits provided by the P & T Department affected Railway operation in one more way. In a few cases of accidents involving loss of human lives, due to the non-functioning of control circuits, the Railway officials could not even contact the site of accident and arrange urgently required relief in time. An instance in this regard is a major accident which occurred near Mainpuri station on the Northern Railway, in which a number of foreign tourists lost their lives.

3.5. While on the one hand the Railways' requirement for additional circuits was not fully met by the

P & T Department, on the other, even the circuits available with them became prone to long interruptions resulting from thefts of copper wires. Whenever there was any interruption in these circuits during night hours the restoration had generally to wait till the next day since the staff of the P & T Department did not undertake any repairs during the night hours. As train movements take place round the clock, the Railway operations faced a serious situation.

3.6. To overcome the above problem the Railways drew out a plan to gradually take over the land wire alignment from the P & T Department. The P & T Department also favoured this course of action. In this context, an extract from a letter† written by the then Secretary, Department of Communications to the Chairman, Railway Board, is reproduced below :

.....During discussions with the Officers in the Railway Board, we had agreed that certain alignments which are used either exclusively or primarily by the Railways and do not carry any traffic for the P & T, could be transferred permanently to the Railway Administrations concerned. I feel that gradually Railway Administrations should take on the responsibility for maintaining the essential wire communications, which are meant wholly for the Railways and are not really a part of the commercial network required by the P & T Department.....".

3.7. In view of the above, starting from 1969, the P & T Department agreed to a number of proposals from the Railway Board to hand over their land wire alignments to the latter.s

3.8. On such of the routes where the condition of the P & T Department's overhead wire alignments was bad, needing replacement, the Railways, instead of taking them over, started erecting their own departmental alignments. The progress in this regard is given in Table 5.2.

Table 5.2

**Progress of the Railways. Departmental Wire Alignments.**

Year ending	Aggregate route length of departmental wire alignments
31-3-1974	5,680
31-3-1975	6,877
31-3-1976	7,451
31-3-1977	9,511
31-3-1978	10,211
31-3-1979	10,539
31-3-1980	10,705
31-3-1981	10,780
31-3-1982	10,957

a Part of this section i.e. Rangapara North-North Lakhimpur, has since been taken over by the Railways and it is learnt that its performance has improved.

† Source : General Manager, Northeast Frontier Railway's D.O. letter No. N/242/7/37(W), dated 20 January 1978, addressed to Director (S&T), Railway Board, New Delhi.

‡ Letter No. 8-3/64-N, dated 14/18-8-1964 from Shri LCMCM Jain, Secretary, Government of India, Department of Communications, New Delhi, addressed to Shri D.C. Bajjal, Chairman, Railway Board New Delhi.

§ In view of its importance, we have discussed this subject in greater detail in the next Chapter.



3.9. It would be observed from the above table that the progress of the erection of departmental wire alignment has been slow after 31 March, 1978. This would clearly need to be accelerated\*. The Railways have used ACSR† wires instead of copper wires for these alignments, since the former are less prone to thefts. However, due to the increase in the cost of aluminium in the recent years, ACSR wires have also started getting pilfered. One solution to this problem can be the use of copper-weld‡ wires in lieu of the ACSR wires. We have been informed that the performance of copper-weld wires is as good as that of the ACSR wires, while the former are less prone to thefts. We suggest that the Railways should examine this alternative.

3.10. *Telecom. cables on electrified routes.*—To handle the growth of traffic on the trunk routes, the Railways, in the late Fifties, embarked upon a programme of electrification of these routes. On the electrified routes overhead wire lines cannot be used as, due to their proximity to the AC traction equipment, they tend to develop high voltages on account of the 'induction effect'. On such routes either underground 'screened§' telecom cables or radio-relay equipment has to be used. The Railways went in for underground screened cables@. These cables not only replaced the earlier overhead wires for 'block' and 'control' circuits, but also provided additional dedicated circuits for : (i) remote operation of power supply installations viz. circuit breakers, isolators, etc. from the control office, and (ii) monitoring of rolling stock and traction installations.

3.11. In the early stages of electrification, underground cables were provided by the P & T Department and leased to the Railways for their use. The Railways, however, experienced considerable difficulties in this arrangement : there were serious problems of coordination in commissioning by the P & T Department of their telecom cables simultaneously with the electrification of the routes. There were many occasions when the commissioning of the electrified routes had to wait for the commissioning of the cables. Since these telecom cables were meant for the Railways exclusive use, and in any case, had to be funded from their own budget, the Railways decided to provide these cables themselves. By 31 March 1982, 6,700 route kilometres of such telecom cables had been laid, out of which 5,300 kms. were provided by the Railways themselves.

3.12. The telecom cables on the electrified routes provided by the P & T Department, are mainly on the Eastern and South Eastern Railways. Over a period of years, due to inadequate maintenance, the condition of these cables has deteriorated. There have also been frequent thefts of portions of these cables, which had to be replaced, resulting in additional cable joints. Further, due to poor soil conditions in the area, corrosion of the cables sheathing has taken place : on certain stretches the sheathing has also been eaten away. On such stretches of the cable, the 'screening' effect provided by the sheathing has been lost and there is heavy induction leading to serious deterioration in the circuit efficiency. It may be mentioned here that, on account of proper maintenance, the Railways own signalling cables in these areas, which are similar to the P & T Depart-

ment's telecom cables, have not been affected to the same extent.

3.13. Corrosion of the cable sheathing and the large number of joints introduced on account of repeated thefts have adversely affected the cable efficiency in another way: the cables have become prone to ingress of water during the rainy season, at the joints as well as at the locations where the sheathing has become heavily corroded. Thus faults in these cables particularly during the monsoon season have become very frequent.

3.14. The underground telecom cables need 'repeater' stations, at regular intervals. We have been informed that the design of the repeaters adopted by the P & T Department, had only a limited level of amplification, which had more or less already reached its maximum use right in the initial stages. Since the number of joints in the cable lengths between two repeater stations is now much more than what is permitted normally, the speech on the circuits has become almost inaudible. This has thrown a heavy strain on the controllers who now have to try hard to make out what is being spoken by the stations connected on these circuits and have also to speak much louder for their voice to be heard by the stations.

3.15. Further, the design of the repeater stations initially used by the P & T Department, employed vacuum tubes, which required 220 V AC supply and hence could not be run on batteries. Generators were, therefore, provided at some of the repeater stations to work as a stand-by source of power supply in the event of main power supply failure. At many of the repeater stations these generators have become defective and have not been replaced by the P & T Department. This results in the circuits getting interrupted whenever there is a failure of power supply. The Railways tried to overcome this difficulty, to some extent, by arranging power supply from the OHE\*\*. This, however, did not solve the problem fully since in the event of failure of the power supply from one sub-station to the OHE, all the circuits including those used for remote control of traction equipment, get interrupted. As it is only for such eventualities that the remote control circuits are required to arrange power supply to the OHE from another sub-station, this arrangement did not prove satisfactory. Performance of the circuits thus continued to suffer.

3.16. It is clearly important to arrange proper maintenance of the telecom cables. Interruptions in the circuits provided by the cables not only adversely affect the efficiency of train operations, but also have a bearing on safety. We, therefore, consider it necessary that the cables laid by the P & T Department, whose performance has deteriorated on account of excessive number of joints, corrosion of sheathing, etc. should be replaced. This replacement can be done either by a new telecom cable or radio relay control communication system can be provided in lieu of the cables§. We understand that the Railway Board has programmed replacement of the defective telecom cables on certain sections by radio-relay links. This should be progressed on a higher priority.

\* We have, in Chapter VII, indicated the routes on which the Railways tele-communication may continue to depend on overhead line wires in the near future.

† Aluminium conductor steel reinforced.

‡ These are steel wires over which a thin coating of copper has been deposited by electrolysis process.

§ Even the underground cables have to be provided with a special type of sheathing made of aluminium to guard against the

induction effect.

@ These cables generally have a capacity of 14 circuits.

£ The large number of joints, thus introduced, have resulted in considerable amount of noise on the circuits.

\*\* Over-head traction equipment.

§§ We have discussed this subject in greater detail in Chapter VII.



3.17. *Telephone exchanges and trunk boards.*—To meet their increasing need of communications, the Railways have set up a number of telephone exchanges at Zonal/Divisional headquarters, sub-offices and important activity and service centres. These exchanges, besides providing the facility of inter-communication to the Railway officials for coordination and control, also give them access to trunk circuits. Over the years the number as well as the capacity of these exchanges have been growing. As on 31 March 1982, there were over 250 automatic telephone exchanges, ranging in capacity from 50 to 1000 lines. The growth in the capacity of the Railway exchanges in the last few years is shown in Table 5.3.

Table 5.3

## Growth of Railway Telephone Exchanges

Year	Telephone exchange capacity (Number of lines)
1973-74	45,514
1974-75	47,507
1975-76	50,063
1976-77	52,324
1977-78	52,324
1978-79	53,660
1979-80	55,938
1980-81	58,020
1981-82	61,561

3.18. In the early stages, all the telephone exchanges provided by the Railways, were of the 'manual type'. Though the Railways have replaced the outmoded manual exchanges by automatic exchanges at a large number of stations, the former type still continues to be used at several stations. Further, the automatic exchanges provided by the Railways are of the 'strowger' type. The strowger exchanges have a number of 'inadequacies': they can establish only a limited number of telephone conversations simultaneously, they require higher maintenance effort, and they wear out fast under intensive usage. In all developed countries abroad, strowger exchanges have either been already replaced or are being swiftly phased out.

3.19. Not only are the Railways telephone exchanges of obsolete type, their number is also far short of the requirement. Many major activity/service centres still continue to be without the facility of the Railways own telephone exchanges. As a result, coordination amongst the various officials connected with train working at these places, continues to suffer. Even at many

of those places where the Railways have installed telephone exchanges, their capacity is not adequate to provide the required connections. The Railways would, therefore, have to set up new telephone exchanges at such of those activity centres where they are urgently needed but do not exist at present and also augment the capacity of important existing exchanges to meet their growing requirements.

3.20. Like telephone exchanges, the 'trunk boards' used on the Railways also have many shortcomings. Both long-distance and short-distance trunk circuits

have been terminated on the trunk boards in the Railways trunk exchanges. These trunk boards are also not suitable for the type of telecom services required by the Railways. Trunk calls, on the Railways, are of widely varying durations, and require frequent switching from one official to another. This, however, can only be done with the assistance of the operator at the receiving end. Since these trunk boards do not have the facility for attracting the attention of the operator after a call has been put through, time is generally wasted when a call is required to be switched over to another official at the same place. Also not more than five circuits can be terminated on a trunk board although an operator can easily handle upto eight to ten circuits. Further, as only two-wire circuits could be terminated on the trunk boards, there is an inherent speech loss. Therefore, when more than one short-distance telephone circuits are connected in series, through the trunk board, for extending a call, the speech level becomes very low. The present trunk boards, therefore, have a serious limitation in the proper utilisation of even the existing telecom facilities. We propose to deal with these shortcomings and give our recommendations in a subsequent Chapter.

3.21. *Microwave system.*—As mentioned earlier, for the purposes of control, coordination and collecting data from important activity centres, the Railways also require direct telecom circuits. These circuits, known as 'administrative circuits', inter-connect Zonal and Divisional headquarters with important activity centres and are also utilised for holding discussions between Zonal and Divisional Railways officials, for jointly reviewing and planning train operations.

3.22. Till about two decades ago, almost all such telecom circuits were also rented by the Railways from the P & T Department and were derived over their physical wire lines, or carrier channels, or coaxial cable system. Even though the Railways had to pay heavy rental charges for these circuits, their performance was not adequate to meet the Railways operational requirements. Also, with sharp deterioration in the performance of majority of the control circuits, the Railways needed additional direct telecom circuits between the control offices and important stations. This required not only provision of speech channels but also the facility for selective calling of various stations connected to these channels. It may be mentioned here that in the Railway operations, selective calling facility is used intensively. This disturbs the efficiency of other circuits provided on the telecom system. Such disturbance, while being acceptable on the short distance dedicated departmental circuits, affects the performance of high quality circuits which have to conform to much higher standards.



3.23. Consequently, in the early Sixties, the Railways decided to provide microwave radio relay system to be owned and maintained by them to cater to their specialised needs. This system was designed not only for providing direct telephone/teleprinter circuits between the Zonal and Divisional headquarters as well as between the latter and important stations on the Divisions but also for 'radio patching'\* of control circuits.

3.24. The Railways have gone in for 7 GHz† microwave system, which has been supplemented by spur links using UHF (450 MHz range) or VHF (150 MHz range). These microwave communication links, as pointed out above, were initially designed to serve the individual needs of the various Zonal Railways for administrative circuits and for radio patching of control circuits. However, in due course the various microwave links of the different Zonal Railways have been integrated. Since the original objective behind provision of the microwave links was a limited one, the system as designed was on a modest scale, with its ultimate capacity going only upto 120 channels. In view of the integration of various links, the entire capacity of the system soon became saturated.

3.25. By 31 March 1982, the Railways have installed microwave links over about 13,400 route kilometres and work was in progress on another 4,700 route kilometres. Although the microwave system has been provided on all the Zonal Railways, there are number of Divisions which have not yet been connected with the Zonal headquarters through such a system. Even some portions of the 'arterial' routes have also not been covered by this system so far. The Railways should provide microwave links on these gaps also expeditiously. A map showing the microwave network is given at Annexure A-5.1.

3.26. The Railways microwave system was basically designed for control patching, speech and teleprinter communication. To keep the cost low, the repeater station spacing has been kept long and also stand-by facilities have not been catered for in certain cases. As a result, while the working of the microwave system for short distance telephone/teleprinter communication has been found to be satisfactory, some problems have been experienced in the long distance circuits, inter-connecting Zonal headquarters situated far away. Also, since data transmission was not envisaged at the time of installing microwave system in its present form, it cannot support data transmission. All the 120-channel capacity of the existing microwave system has already been more or less fully utilised on most of the trunk routes. The reliability of the system though much superior to the land line system used earlier, has not been of the standard expected of a telecommunication system supporting data transmission, mainly because stand-by arrangements termed as 'frequency diversity' and 'space diversity', have not been incorporated in

the system. The system will, therefore, require to be considerably strengthened if it is to serve the needs of the proposed computerised freight operation and passenger reservation of the Railways. We would examine this in some detail in a subsequent Chapter.

3.27. A view has been expressed in certain quarters that provision of independent microwave system by the Railways amounts to duplication of similar facilities installed by the P & T Department. It has been argued by these quarters that instead of going in for an independent system, the Railways should have relied on the P & T microwave links at least in those areas where the latter run parallel to the railway tracks. The Railways have been taking the position that their requirements are such as cannot be met by the system configuration installed under the P & T system. We propose to examine this issue in depth in the next Chapter and give our recommendations on the policy that should be pursued by the Railways in this regard.

3.28. *Intra-yard communication.*—Major yards of the Railways are usually spread over extensive areas. For efficient functioning of these yards a continuous coordination between the various officials connected with train working has to be maintained. For this purpose, requisite telecom facilities inter-connecting these officials are needed. Such facilities have, however, not been provided in many of the yards and where provided, are now obsolete. For instance, in some of the major yards 'paging' loudspeaker system has been installed for the yard supervisor to give instructions to the shunting staff. Since such a system has the facility of only 'one way communication', the shunting staff are not able to communicate their problems to the yard supervisor. In a few other yards, the Railways have provided 'paging and talk-back' loudspeaker system. Even though this system provides facility to the staff for communicating with the yard supervisor, certain problems have been experienced with it also. The staff have to walk upto the nearest location having the facility of talking back with the yard supervisor. The Railways' experience has been that there is often reluctance on the part of the staff to leave their work and walk upto these locations, with the result that this system has also virtually remained one way communication system. In the interest of improving efficiency of the yards, the Railways would have to replace these obsolete systems by modern walkie talkie sets.

3.29. In major yards, communication facilities are also needed for coordination between the supervisors belonging to different departments. In many of the yards, such communication facilities have been provided with obsolete type of magneto telephone circuits. These circuits at present exist both on land lines and on telecom/signalling cables. Efficiency of these magnetophone is very low. We propose to discuss the provision of modern communication facilities to these supervisors in detail in a subsequent Chapter.

\* 'Radio patching' is an arrangement of improving the reliability of the control circuits by using micro-wave channels. A number of microwave channels provide multi-point connections between the control office and the control circuits. The arrangement also requires signalling facilities, i.e., facilities for selectively calling individual stations, cabins, yards, goods sidings, loco sheds, rolling stock overhauling depots, etc. on the microwave system.

† The frequency band varies from 7,125 MHz to 7,425 MHz.

§ We have been informed that the normal spacing of the repeater station should have been 40 kms. The Railways have, however, provided an average spacing of 60 kms. for the various microwave links on the system. This however does not indicate the whole truth, as in many cases the individual distances vary from 100 to 140 kms. No wonder that there is repeated 'fading of voice over such lengths'.



3.30. *Teleprinter circuits.*—A number of teleprinter circuits\* have been provided between the control office and important yards on a Division as also between the major yards on the adjacent Divisions. This has been done to facilitate exchange of periodic 'operating position', viz., the position of 'train consists' on the various lines of the yards, motive power, etc. Similarly, teleprinter circuits have also been provided between reservation offices in the Zonal and Divisional headquarters. The objective behind this was to ease the pressure on long distance telephone circuits. We have been informed that full use of these facilities have not been made in some regions due to various reasons, including an inherent resistance of field staff to any change\*\*, lack of information about the potential of the system and in some cases non-availability of staff for using these facilities. In a few cases, the present low speed of teleprinter transmission has also been a limitation. The Railways would have to make greater efforts to make optimum use of these facilities.

3.31. *Miscellaneous telecom facilities.*—The Railways have provided public address systems at important stations to disseminate information to passengers regarding the arrivals and departures of trains. Equipment used at many of these stations is not of the proper quality, with the result that announcements made over the system, are not intelligible. Not only that the Railways would have to replace such equipment by that of proper quality but also that the public address system would have to be progressively extended to other major stations.

3.32. Electronic train information display systems have also been installed at stations in the metropolitan cities, for visually displaying information regarding arrival/departure timings of trains, the corresponding platform numbers, etc. Closed-circuit TV systems have also been provided at a few important stations such as New Delhi and Madras, for the same purpose, as also for displaying other information such as fares and running of special trains. These systems are presently being operated locally but with the gradual centralisation of yard functions, their control should eventually be shifted to the centralised† power cabins.

3.33. Provision of direct communication between the guard and the driver of longer super-fast intercity trains is an essential pre-requisite for the operation of such trains. With the increasing growth in the passenger traffic, more such trains are likely to be introduced in future. The through communication between the driver and the guard for such trains has presently been provided by using physical line wires fitted in the coaches and removable type of couplers inter-connecting the adjacent coaches. This system is not satisfactory as, sometimes, due to vibration, the couplers disengage, thereby interrupting the communications. Shunting of coaches enroute also causes problems. To improve the reliability of the system, the Railways would have to switch over to radio communications. The Railways have also planned introduction of heavier freight trains on 'arterial' routes. As direct communication between

the driver and the guard of such heavier freight trains is equally important, similar radio communication systems would have to be used for them also.

#### 4.0. Conference facilities.

4.1. Real-time coordination of operational activities on the Railways is essential in the interest of efficiency. This has to be done by the Management at three different levels i.e., Division, Headquarters (Zonal) and Railway Board. It is, therefore, necessary to provide proper telecom conference facilities at these levels to enable the Management to review and plan out operation, by a quick exchange of ideas and discussion of essential day to day operational features. This would involve officials at the various levels not only to sort out day to day problems but also to analyse current operational features, to regulate and monitor traffic streams and to plan out strategy for next day. It would generate participation in decision making and also accountability at the different levels.

4.2. The Conference Circuits should be on microwave with two-way communication facilities as follows

Divisional Hq.	Link important stations and yards; terminate in the Conference Room.
2. Zonal Hq.	Link Divisional Conference Rooms; terminate in the Hq. Conference Room.
3. Railway Board.	Link Zonal Hqs.

4.3. The Conference Rooms should be air-conditioned, fitted with mikes and have adequate accommodation to enable a group of officers to take part in the Conference. Suitable electronic devices should be provided to give the facilities of connecting/disconnecting the various circuits.

4.4. This system, in different forms, is already being used on the Railways abroad. Its contribution in improving efficiency in operations has been substantial. The system would also provide coordination between different departments as they would also be participating in the Conference.

4.5. Presently this facility has been improvised by talking at both ends, individually on the telephone circuits. This is not only a time consuming exercise but has very limited value. We recommend that modern Conference facilities should be provided on our Railways on the lines indicated above.

\* These circuits have been provided either on land wire alignments or microwave links.

\*\* Prior to the installation of teleprinter facilities, the operating position used to be transmitted through long distance

telephone circuits.

† Power cabin, a centre of location at major stations from where all signals and points are operated electrically, and movements in the yard are controlled.



## 5.0. Conclusions.

5.1. Telecommunication facilities are not only essential for operating a rail transport system, but also constitute a vital means for improving their productivity.

5.2. Considering their geographical extensiveness and complexity of operations, the Railways' requirements of telecommunication facilities are highly specialised.

5.3. Telecommunication facilities needed by the Railways can be broadly classified into two categories : (i) those which are directly connected with train working, and (ii) those which are used for coordination/control functions and data transmission. Whereas 'block circuits' and 'control circuits' come under the former category, direct telephone/telegraph/teleprinter circuits between the Zonal and Divisional headquarters as also important activity/service centres, fall under the latter category.

5.4. Uptill the Fifties, the Railways mainly depended upon the P & T Department for installation and maintenance of their telecom facilities. Since traffic was light, this arrangement worked well.

5.5. With the growth in rail traffic from the Fifties, the then existing telecom facilities become inadequate to handle the increased traffic. The Railways also experienced a drop in the efficiency of the circuits hired from the P & T Department.

5.6. To overcome this problem, the Railways decided to gradually take over the land wire alignments from the P & T Department.

5.7. The P & T Department also favoured this course of action. On such of the routes where the condition of the P & T Departments' wire alignment was bad, needing replacement, the Railways erected their own departmental wire alignments.

5.8. Due to various reasons, sufficient progress either in taking over wire alignments from the P & T Department or in erecting the Railways own departmental alignments, has not been made.

5.9. The Railways have used, in the case of their own alignments, ACSR wires instead of copper wires. Due to increase in the cost of aluminium in the recent years, ACSR wires have also become prone to pilferage. The Railways should, therefore, consider use of copper-

weld wires in lieu of ACSR wires as the former are as good in performance as the later, but are less prone to thefts.

5.10. On the electrified routes, overhead line alignments cannot be used on account of the induction effect, due to their proximity to AC traction equipment. On such routes, underground 'screened' cables are utilised. Initially, the screened cables were provided by the P & T Department. Due to a number of difficulties in installation and maintenance of these cables by the P & T Department, the Railways later on laid their own telecom cables.

5.11. As on 31st March 1982, 6,700 route kilometres of such telecom cables had been laid, out of which 5,300 kms. were provided by the Railways themselves.

5.12. In those locations where telecom cables have got severely corroded or where very large number of joints have been provided on account of thefts of portions of cables, the Railways should take early action to replace entire cables lengths either by new ones or through radio relay links.

5.13. The Railways have also provided their own telephone exchanges. Neither the number of these exchanges is enough nor their capacity adequate to meet the Railways' requirements.

5.14. In the interest of efficiency of operations, both the number and capacity of these exchanges would have to be augmented. Further, these exchanges are of obsolete type and would require to be replaced by modern electronic exchanges.

5.15. The Railways have also installed microwave systems to provide direct telephone/teleprinter circuits between the Zonal/Divisional headquarters and important activity/service centres. There are, however, still many gaps in the microwave links even on the 'arterial' routes. The Railways should expeditiously close these gaps.

5.16. For intra-yard communication, 'paging and ~~at-track~~ loud speaker systems installed by the Railways, are not efficient. These systems should be replaced by walkie-talkie sets.

5.17. In many of the yards communication facilities, amongst the supervisors of the different departments is by magneto-phones. Magneto-phones should also be replaced by modern communication facilities.

5.18. A number of teleprinter circuits between the Divisional offices and the major yards, have been







## CHAPTER VI

### TELECOMMUNICATION : DEDICATED FACILITIES

#### 1.0. Introduction.

1.1. We mentioned in the last Chapter that telecommunication facilities are integral to a well-knit and effective railway infrastructure. We also mentioned that the telecommunication facilities needed by the Railways broadly fall in two categories : (i) those which are directly connected with train working, viz., 'block' and 'control' circuits, and (ii) those which are required for collecting information from activity/service centres for planning train movements, and for control and co-ordination functions, viz., direct telephone/telegraph\* circuits between the Zonal and Divisional headquarters, and between control offices and other activity/service centres.

1.2. Though historically the telecommunication facilities for the Railways have been provided almost entirely by the Posts and Telegraphs Department, the need for the Railways to have their own independent network has been the subject of detailed examination by the Government from time to time. As early as 1945, the Secretary of the then Posts and Air Department, had permitted the Railways to develop wireless services as a permanent measure, to the extent necessary for their efficient functioning\*\*. At that time installation of wireless circuits was restricted to only those sections where telecom services could not be efficiently provided by land-line wires, for instance on the hilly sections. Since then, the Railways have been expressing the need and desirability of owning and maintaining their independent telecom network to adequately meet their specialised operational needs. We propose to examine in this Chapter the policy that should be adopted for providing telecom facilities for the Railways.

#### 2.0. Suggestion of the Estimates Committee (1955-56).

2.1. In the wake of heavy growth in rail traffic from the Fifties, the subject of the adequacy or otherwise, of the Railways' telecom facilities was examined by the Estimates Committee of the Parliament. This Committee, in their Report for 1955-56, had suggested that the Railway Ministry should ascertain the practice prevalent in foreign countries in respect of telecom facilities for their Railway Systems so that a programme for improvement of telecom facilities on the Indian Railways, could be expeditiously carried out in the larger interest of the country as a whole. A reference was accordingly made by the Railway Ministry to the High Commissioner of India in the United Kingdom, for ascertaining the position in this regard in various countries. After collecting the requisite information from the French, German, Belgian, Swiss and British Railways, the High Commissioner reported as under :

\* Some of the telegraph circuits have since been converted into teleprinter circuits.

\*\* Cf letter No. T-30/45, dated 2 February 1945 from the Secretary, Posts and Air Department, placed at Annexure A-6.1

† Cf. Page 39, Railway Board's file No. 71B(C)-RB/7.

"It has been the general practice in all the countries for the Railways to provide and maintain at their own expense and for their exclusive use the telecommunication network necessary for operational communication. This network is quite independent of that maintained by the G.P.O. who are responsible for the public communication network of the whole country".†

2.2. Enquiries made by us had also revealed that for meeting their operational needs, most of the Railway Systems even outside Europe, in Japan and USA, had instated and were maintaining their own telecom networks.

2.3. Our Railway's telecom facilities are based on (i) land-line wires, and (ii) microwave network.

#### 3.0. Overhead line wires.

3.1. Till the early Sixties, the Railway's telecom facilities, both for block/control circuits and direct telephone/telegraph circuits, depended primarily on the overhead line wires. As stated by us earlier, these line wires, except on a few sections‡, were provided and maintained by the P. & T. Department. It is only from the mid-Sixties that the Railways started developing their own microwave links for providing direct telephone/teleprinter circuits between the Zonal and Divisional headquarters as also between the Divisional headquarters and other important activity/service centres. With the development of the microwave links on their various routes, the Railways surrendered the direct 'point to point' telephone/telegraph circuits which they had earlier taken on lease from the P. & T. Department. For the block/control circuits, the Railways, however, still continued to depend on the P. & T. Department's overhead line wires, except on the electrified routes.

3.2. On the electrified routes, as already mentioned in Chapter V, the Railways due to technical reasons had to go in for underground telecom cables, in lieu of the overhead line wires. These underground cables, which provided block as well as control circuits were, except in the initial stages, installed and maintained by the Railways themselves. The Railways have already electrified about 6,000 Kms. of their trunk routes. They also have a massive programme of electrifying§ the remaining trunk routes as well as important main lines. In view of this, by the turn of the century, the Railways' reliance on P & T Department's overhead line wires for block/control circuits on electrified routes is likely to altogether cease, except on the branch lines and a few of the main lines.

3.3. Since block and control circuits are dedicated circuits used by the Railways for controlling train

‡ For instance, overhead line wires on the various sections of the Madras and South Marhatta Railway (which later got merged with the Southern Railway), were owned and maintained by this Railway, even prior to 1940.

§ Cf. Chapter VIII of Part II of our Report on TRANSPORTATION.



movements on a 'real time' basis, it is necessary that their control and maintenance, on all routes, should vest with the Railways. This argument has also been accepted by the Ministry of Communications. In this context an extract from the observation made by the Secretary, Ministry of Communications is reproduced below :

"The P & T Department handles its traffic (both telephones and telegraphs) on a 'delay' basis, whereas the Railways require the traffic, particularly on control circuits, to flow on a 'demand' basis. It is this difference in the primary concept of handling traffic that justifies a separate network for the Railways, or for other Departments which need circuits for 'real time' traffic".\*

3.4. As the train movements take place round the clock, the Railways' operational requirements are such that the performance-reliability of their telecom circuits has to be of a very high order. In case of a failure, all the circuits have to be immediately attended to and set right. The P & T Department is, however, not able to fulfil this requirement. In this connection, an extract from the letter written by the Secretary, Ministry of Communications to the Accountants General (CW & M), is reproduced below :

"From the operations angle, when a system in general telecommunication network fails, certain priorities are observed in the restoration e.g., engineering speaker-† civil circuits,‡ voice-frequency telegraph circuits, Defence and other circuits, in that order. The P & T Department cannot change these priorities to suit the operational needs of the Railways".\*\*

3.5. In case of train accidents and dislocations or similar other occurrences like floods, breaches, earthquakes, landslides etc. on the railway track, the Railways have to immediately set up communication links between the site of such occurrences and the Divisional/Zonal headquarters. In such cases the Railways, if they have their own telecom network, would naturally be in a better position, as compared to the P & T Department to set up such communication links with the promptitude and seriousness demanded by the situation.

3.6. In view of the above, we are in agreement with the Railways' taking over the control and maintenance of the overhead line wires from the P & T Department. Our specific recommendations in this regard are as under :

1. On such of the routes where the P & T Department's overhead alignments carry wires exclusively used by the Railways, the control and maintenance of these alignments should be transferred to the Railways.
2. On those routes where the P & T Department has two overhead alignments, each used both by the Railways and the P & T Department, and where one alignment can be segregated for the Railways' exclusive use, such segregation should be urgently done and the alignment

carrying wires used by the Railways only should be handed over to them.

3. On those routes where such segregation is not possible, or where the condition of the wire alignments is very bad, needing replacement, the Railways should erect their own departmental alignments and surrender the circuits taken on lease from the P & T Department.
4. On such of the routes where the Railways are proposing to lay their own underground telecom cables, in view of their proposed electrification, the Railways should not take over overhead line wires from the P & T Department. The Railways should also not take over overhead line wires from the P & T on those uneconomic branch lines which are likely to be closed down.

#### 4.0. Microwave system.

4.1. Microwave links on the Railways were installed to provide : (i) telephone/teleprinter circuits for inter connecting the Zonal and Divisional headquarters as well as operationally important points like major yards, junction stations, loco sheds, etc., (ii) radio-patch, facility for control circuits on some of the high-density routes, and (iii) communication facility between the moving trains and fixed points such as control offices. Although the communication facility between the moving trains and fixed points has not yet been introduced, the microwave system installed has the potential to enable introduction of this facility in future.

4.2. The Railways' microwave system thus does not envisage complete replacement of the overhead line wires on non-electrified sections or the underground cables on electrified sections, which presently provide the block/control circuits for regulating train movements.

4.3. This microwave network in its present state, as discussed by us in the next Chapter, is also not suitable for data transmission purposes in connection with the proposed computerisation of freight operations and passenger reservations. For these purposes, this network would need considerable expansion and strengthening.

4.4. A view has been expressed in certain quarters that an independent microwave network for the exclusive use of the Railways may not be an economic proposition. It has been argued that it would be advantageous from the national angle to coordinate and develope the microwave links of the Railways with those of the P & T Department. It has accordingly been suggested that all future microwave links of the Railways, at least in those areas where similar links of the P & T Department already exist, should be avoided altogether and the requisite number of microwave circuits taken on lease from the P & T Department, and vice versa. We have examined this suggestion carefully and our views are given below.

4.5. To fulfil their operational needs, the Railways have to interconnect their Zonal/Divisional headquarters with major activity/service centres, which are located

\* Extract from letter No. 70-71/71-TPL, dated 17 December 1971, from Secretary, Ministry of Communications addressed to Accountant General (CW & M), New Delhi.

\*\* Cf. \* above.

† Maintenance circuits of the P & T Department.

‡ If there are more than one civil circuits or voice frequency telegraph circuits on a route, restoration of only one circuit in each of these two categories is given priority over the Defence circuits. It may be added that most of the Defence circuits are dedicated lines.



along the railway tracks. The design of the Railways' microwave network has, therefore, to cater for 'dropping' of channels at these centres of operations. Microwave network requires 'repeater' stations at intervals of 40 to 50 kms. The Railways, therefore, design their microwave network in such a way that repeater stations are generally able to cover the above centres of operations. These repeater stations are utilised for dropping of channels to meet the communication needs of the Railways.

4.6. Microwave network of the P & T Department on the other hand is basically designed for altogether different parameters. In their case, the design consideration is to carry a large number of telecommunication channels from one important civil centre to another, a long distance away, without the need to drop any channels in between. Further their network unlike that of the Railways to conform to certain specific standards so as to be compatible with the international network.

4.7. The systems design criteria required for the Railways' communication network are thus entirely different from those of the P & T Department's network. In case the design criteria of these two communication networks are to be amalgamated, the resulting design criteria, for the amalgamated network, would be very severe and would result in an uneconomic system.

4.8. The question of an independent microwave network for the Railways was considered by a Special Committee of the Secretaries, Government of India headed by the Cabinet Secretary, in the late Sixties. After detailed examination, they also accepted the need for the Railways to have a separate communication microwave network. In this connection, the statement of the Secretary, Department of Communications, in the meeting held on 2 September, 1969, agreeing to the necessity for a separate network of the Railways, is reproduced below:\*

"The Secretary, Department of Communication stated that the requirements of the Railways are such that they cannot be met from the existing P & T network. The Railways require 'drops' at various points and the quality of services required is not of the same standard as the service needed on the civil network. If the points required by the Railways were linked to the P & T network it would seriously interfere with the quality of service on the civil network, which has to be maintained according to certain international standard. On the other hand, raising the quality of service of all the Railway points in the link-up would be uneconomical".

4.9. The subject of Railways' own microwave network again came up when the Comptroller and Auditor General gave a Draft Para in the Audit Report of 1970-71 for "failure to coordinate the microwave schemes of the P & T and the Railways." This matter was then once again examined in great detail by both the Ministry of Railways and the Ministry of Communications. The stand taken by the Ministry of Communications on this issue can be seen from the following extracts of their reply furnished to the Audit:\*\*

"The Railway network has to be tailored to their needs. If it is combined with the P & T's net-

work, alterations in the system configuration, as and when required by the Railways, is not practicable. Coordination of the P & T network with the Railway network is not feasible since the P & T network is engineered from the point of view of general public traffic, both national and international and has to conform to certain standards laid down by the CCITT† and the International Telecommunication Union at Geneva. The Railway network, serving a specific need of the Railways only, need not meet these standards at all.

"In view of the above facts, coordination between the P & T network and the requirements of the Railways, as was envisaged in the earlier days, is not feasible."

4.10. On the strength of this explanation, the above audit para was dropped.

4.11. Keeping in view the Railways' special telecom requirements for operational purposes, and the technical difficulties involved in coordinating and dovetailing their network with that of the P & T Department, we recommend that the present policy of the Railways themselves installing, operating and maintaining their own independent microwave network should be continued.

4.12. There is one more reason which further justifies such a course of action. In connection with the proposed computerisation of freight operation and passenger reservations, the Railways would have to completely revamp even their existing microwave networks. This has become necessary not only because additional telecom-channels for data transmission would be needed, but also because these channels must have very high performance reliability-almost to the extent of 99.99 percent. For unified command and control of the computerisation project, it is essential that the microwave communication network must be maintained and operated by the Railways. We understand that this is also the overwhelming view of the Committee of Secretaries, which in 1981, had gone into the proposed computerisation programme of the Railways. We fully endorse their view as rational and pragmatic.

## 5.0. Conclusions.

5.1. Telecommunication facilities needed by the Railways broadly fall in two categories: (i) those which are connected with train working, viz., 'block' and 'control' circuits, (ii) those which are required for collecting information from activity/service centres for planning train movements and for control and coordination functions.

5.2. Till the early Sixties, the Railways' needs for both the above types of telecom facilities were being primarily met by the P & T Department's overhead line wires. With the progressive installation of the Railways' own microwave links, their dependence on the P & T Department for 'point to point' telephone/telegraph circuits, has been tapering off.

5.3. For block and control circuits, the Railways still continue to depend on the P & T Department's overhead line wires on non-electrified routes. On the electrified route these circuits are provided by the underground cables, mainly laid by the Railways themselves.

\* Cf. page 40 of Railway Board's File No. 71B(C)-RB/7.

\*\* Extract from the letter No. 70-17/71-TPL, dated 17 December 1971, from the Secretary Ministry of Communications addressed

to AG (CW & M), New Delhi.

† International Telegraph and Telephone Consultative Committee Geneva.



5.4. Since block/control circuits are dedicated circuits, used by the Railways for regulating train movements on a 'real time' basis, the existing policy, viz. the Railways taking over the overhead lines from the P & T Department, should be continued. We have made specific recommendations on this subject for the various categories of routes and action should be progressed on the lines suggested.

5.5. On operational technical and financial considerations, integration of the Railways' microwave network with that of the P & T is not feasible.

5.6. The Railways are proposing to go in for computerisation of their freight operations and passenger reservation. For this purpose, they would have to completely revamp their existing microwave systems to provide the requisite number of channels for data transmission, having a performance reliability of almost 99.99 percent. For unified control of their computerisation project, it is necessary that the Railways must have control over the communication channels also.

5.7. In view of the above, the existing policy of the Railways developing their own microwave network, should be continued.

*Annexure A.6.1*

*(Cf. Para 1,2)*

*Copy of letter No. /T.30/45 dated 2 February, 1945 to the Secretary, Railway Board, from the Secretary, posts and Air Department.*

**Sub.—**Provision and use of wireless telegraph sets on Railways.

With reference to Railway Board letter No. ART. 44/WR/45 dated, the 8th January, 1945, this Department

agrees in principle to the development by the Railways as a permanent measure, of wireless services so far as necessary for the efficient working of the Railways and where wireless cannot be replaced by other equally reliable sources of communication on the understanding that such wireless services shall be used solely for the official business of the Railways and that no paid or telephone conversations of any description shall be sent or received.

2. These wireless services will be subject to general control by the Director-General of Posts and Telegraphs and will require in every case a general or special permission issued by the Director-General governing frequencies, power, siting, qualifications of operators and any other conditions required under international agreement or for co-ordination with other wireless services. The service will also be subject to any such provisions as may be considered necessary by the competent department of Government of India in the interest of security.

3. It must be understood that this Department cannot guarantee that frequencies will be available to maintain all the services required by the Railways. Apart from war conditions, there is and will remain very serious congestion requirements in the frequency bands and great difficulty in meeting the requirements of all the various interests. It must be understood that priority in the allocation of frequencies will be given to services for which wireless is the only possible means for communication, such as aviation, Broadcasting, overseas telephony etc. and the number of frequencies available for communications which can ordinarily be provided by lines, is likely to be extremely limited.

Sd./-

*Secretary to the Government of India,  
Posts and Air Department.*

नमो भगवते वासुदेवाय



## CHAPTER VII

### TELECOMMUNICATION—PROFILE FOR THE FUTURE

#### 1.0. Introduction.

1.1. Development under the five-year period-Plans started in India in 1951. Since then there has been substantial increase in rail-borne freight and passenger traffic. To cater to the needs of the increasing traffic, a number of schemes for provision of telecom facilities were undertaken by the Railways. While some of these facilities such as microwave links were provided as independent telecom works, most others formed an integral part of Doubling, Gauge Conversion and Electrification Projects. Development of the telecom facilities on the whole, has, however, substantially lagged behind the requirements of traffic.

1.2. As a result, the development of telecom facilities on the Railways has been both inadequate and sectoral. The proximate causative factor responsible for such a state of affairs has been that such facilities have not been progressed in terms of a longterm integrated plan. This has introduced distortions in the telecom network. For instance, the Eastern Railway, which carries a much higher level of traffic than the North Eastern Railway, has provided less kilometrage of microwave links than the former, even though the network on the North Eastern is by no means adequate. The World Bank, while appraising the telecom facilities on the Indian Railways, in connection with the grant of a loan for their modernisation projects, had observed : "the activities in the field of telecommunication on the Indian Railways are scattered and uncoordinated.\*"

1.3. As mentioned earlier, the Railways are expected to witness a phenomenal growth in railborne traffic during the coming years. Projections made by us indicate that, by 2000 AD, the freight and passenger traffic is expected to go up to 2 to 2½ times of the present levels.† The strategy to handle such a prolific growth in traffic, as suggested by us, include a multiple of measures like electrification of the 'arterial' routes, introduction of heavier freight trains having trailing loads of 4,500 tonnes increasing finally to 7,500 tonnes, superfast inter-city passenger trains with composition of up to 22 coaches, and, amongst other steps computerised freight operation and passenger reservation systems. Adoption of these measures would require complete revamping and modernisation of the telecom facilities on the Railways. In case this is not done, it would not be possible to achieve the optimum utilisation of the assets and infrastructural facilities created for handling the catapult-growth in traffic.

1.4. In view of the above, the Railways would have to frame a long-term integrated plan for the development of telecom facilities for the system as a whole, to cater for not only the present but also the future levels of traffic. Our suggestions in this regard are discussed in the following paragraphs.

#### 2.0. Control communication systems.

2.1. For efficient and safe running of heavier freight and super-fast passenger trains, it would be necessary to provide a continuous direct communication between the control office and the drivers of these trains. Such communication can only be provided by using radio relay equipment, which would work in conjunction with the control communication system. Efficiency of the control circuits on the trunk routes and important main lines, on which these trains would ply, would, therefore, need to be of a very high order.

2.2. As mentioned by us in the previous Chapter, control and block circuits, except on the electrified routes at present depend on overhead line wires. Majority of these circuits not only frequently become inoperative for prolonged period due to thefts of copper wires, but their performance has also deteriorated considerably on account of replacement by the P.&T department of the stolen lengths of copper wire by iron wires of low poundage. These circuits, therefore, cannot be depended upon for providing the required facility of direct communication between the control office and the running trains.

2.3. In the case of electrified routes, control and block circuits have been provided by using under-ground aluminium sheathed telecom cables. Performance of the circuits derived from the underground cables, though generally more reliable than those obtained from the overhead line wires, has also not been satisfactory. This is particularly so on the Eastern and South Eastern Railways, where due to poor soil conditions, the aluminium sheathing of the cables has got heavily corroded. On these routes frequent thefts of portions of the cables have also taken place, leading to interruptions in the circuits.

2.4. The P.&T Department, which had initially laid the cables on these routes and is also responsible for their maintenance, has been replacing the stolen portions of the 'screened' cable by 'non-screened' ones, having thinner conductors. This has resulted in the speech level on the control circuits becoming almost inaudible. There have even been cases of failures of the controllers' selective ringing facility. These control circuits cannot also, therefore, be relied upon for providing direct communication between the control office and the running trains. What is more, these circuits are gradually proving deficient in providing even an efficient control-to-stations communication facilities.

2.5. On the electrified routes, for hauling heavier freight trains, the Railways have to introduce higher horse-power electric locos. The heavy current drawn by these locos from the OHE would cause substantial noise in the control circuits provided by the underground cables. Further in future all the electric locos are going to be equipped with thyristor controls which enable the locos

\* Aid Memorie, World Bank, Railway Mission, January, 1983.

† Cf. Part II of our Report on Transportation, Chapter I, Profile of traffic growth.



to have better electric energy utilisation characteristics. Locos fitted with thyristor control mechanism, however, also cause serious interference in the circuits provided by the cables. This problem can be overcome by the use of 'radio-relay' control communication system in place of the underground cables.

2.6. It may be mentioned that, apart from the immunity against interference from 25 KV AC traction equipment/thyristor equipped locos, the radio-relay system has the following additional advantages over the conventional telecom cable system :

1. Availability of a much larger number of channels, for instance, the radio-relay system can provide upto 120 or even higher number of channels as against 14 available in the conventional telecom cables generally used now.
2. More efficient direct communication between the control office and the running trains.
3. Facility for the control office to directly talk to the officials at the site of accidents, breaches, dislocations, large-scale arsons, conflagrations, etc.
4. Much less maintenance effort.
5. Freedom from pilferage and vandalism, as the entire radio-relay equipment is provided in offices or stations, which are manned round the clock.

2.7. We are happy to note that the Eastern Railway has already planned the replacement\* of the existing underground telecom cable system, on its Mughalsarai-Gaya-Dhanbad Section (210 kms. length), by radio relay control communication system. However, this essential requirement is being introduced late, hesitatingly, on a small scale, and with no integrated plans. We consider that for a requirement of such essential urgency, a programmed introduction on the trunk routes of Eastern and South Eastern Railways should be completed on a very high priority within the next three Annual Plans.

2.8. The radio-relay system would not only substitute all the control and other circuits presently available on the telecom cable, but would also provide : (i) additional circuits to meet operational and maintenance requirements of the various departments, and (ii) facility for direct communication between the control office and running trains. The system comprises a 120-channel, 18 GHz radio relay link having repeater stations with channel dropping facilities at every station on the section. Communication between the repeater stations and the running trains would be through VHF links, which would be extended to the control office through a channel exclusively earmarked for this purpose.

2.9. The cost of this 120-channel radio-relay control communication system, on 210 kms. long route, is reported to be Rs. 7 crores (and may get less with the developing use of integrated circuits) as against Rs. 4 crores for a much smaller 14-channel capacity underground telecom cable system. It would thus be seen that not only the radio-relay system is free from the problem of interference from the OHB/thyristor-equipped locos, but is also economical as compared to the under-

ground cables for providing the same number of channels. Another important advantage is that, unlike over-head line-wires radio relay system is not affected by inclement weather conditions.

2.10. At present, the cost of telecom component of the Railway Electrification Projects is about 8-10 per cent, if the conventional 14-channel underground telecom cable system is used. This cost would increase to 15-17 per cent in case the underground telecom cable system is substituted by a much larger 120-channel capacity radio-relay system. In view of this, it would be advantageous and cost effective for the Railways to gradually switch over to radio-relay control communication system on the electrified† routes.

2.11. Our specific recommendations in this regard are as under :

1. On all trunk routes and important main lines, which are programmed for electrification in future, radio-relay control communication system should be used in place of the conventional underground cable system.
2. On the existing electrified routes, where underground telecom cables have been provided at the time of electrification, the replacement of these cables, whenever due, should be done with radio-relay control communication system.
3. The work under .2 above should be taken up. Whenever the replacement falls due, while the work under .1 should form part of the individual electrification projects.

2.12. As for those routes which are not programmed for electrification in the near future, control communications may continue to depend on the over-head line wires. Exceptions should, however, be made in the case of such of the routes as are located either in the coastal areas where the overhead wires are prone to heavy corrosion, or in those areas where there are large-scale thefts of wires due to the poor law and order situation. On these routes, radio-relay control communication system should be provided whenever replacement of the existing overhead line wires becomes due.

2.13. We also note that the equipment used for communicating with the stations, still continues to be of obsolete type in most of the control offices. For instance, selective calling of stations on the omnibus control circuits, is still done by transmitting DC impulses which require use of high voltage batteries. Calling of the stations is done by using mechanical keys, which have to be turned every time a station is to be called. This antiquated system is no longer suitable particularly on the busy sections where the workload of controllers has become heavy, and intensive. Similarly, section controllers in many of the control offices still continue to use head-sets for communicating with the stations instead of micro phones/loud speakers. We recommend that the Railways should progressively switch over to the use of modern equipment based on solid state technology in place of the existing outmoded electro-mechanical equipment which cannot be expected to function efficiently or match up to the requirements of heavy-density traffic.

\* Replacement of the existing underground telecom cable on this section has become due prematurely, on account of (i) heavy corrosion of the aluminium sheathing of the cable, and (ii) large-scale thefts of the portions of the cable.

† All the routes which have already been electrified or are programmed for electrification in the near future, carry heavy traffic density.



### 3.0. Optical fibre technology.

3.1. A new technology known as optical fibre technology has recently been developed in advanced countries. This is likely to revolutionise telecommunication systems of the future. Optical fibre cables have several advantages over the conventional telecom cables or radio-relay communication system. Unlike the conventional communication cables, optical fibre cables are totally immune to induction effects of the AC traction system or to interference from the thyristor equipped locos. While providing all the advantages of radio-relay communication system, optical fibre cables have the potential of making a very much larger number of channels available as compared to the conventional cable system.

3.2. On account of these advantages, optical fibre technology is beginning to find use in rail-road communications in some of the advanced countries. For instance, the British Railways have already installed optical fibre cable communication system on some of their high density routes. It is only on account of the comparatively higher cost of the optical fibre cables that they have not been used extensively so far. However, with the rapid advances that are taking place in this technology, the cost of optical fibre cables is likely to come down in future.

3.3. The Indian Railways should also keep themselves abreast of the technology of optical fibre communication so as to be in a position to use it as early as practicable. Towards this and we recommend that the Railways should instal, as an experimental measure, optical fibre cable communication system on one of their sections. We recommend this be done on the Grand Trunk Route in the first instance, as this route has extremely heavy traffic density. On the basis of this experiment and as the cost also comes down in the international market, the Railways should take up further extension of the system on the remaining sections of the arterial routes.

### 4.0. Microwave system.

4.1. We mentioned in Chapter V that microwave system on the Railways was primarily introduced to meet the needs of individual Zonal Railways for :  
(i) 'point to point' telephone/teleprinter circuits, and  
(ii) radio patching facility to improve the availability of control circuits. Integration of the microwave networks of the individual Railways in to one complete system to provide long distance telephone/teleprinter circuits, was not envisaged earlier. A short-haul system generally having a capacity of 120 channels, was initially adopted. Reliability of the microwave system was kept anywhere between 90 to 99 per cent, which itself was a great advance over the reliability of the then existing overhead line wires.\* To keep down the cost, repeater stations were located as far apart as was possible for a short-haul system as a result the average hop-length† provided for the repeater stations was 60 kms., though in a few cases the maximum length extended up to 140 kms.

4.2. Later the microwave networks of the individual Railways were integrated into one system. Since the individual networks were planned for a limited objective and such an integration was not envisaged the present microwave system of the Railways, which has served useful purpose with limited objectives, suffers from the following deficiencies :

1. Hop-lengths for repeater stations are larger than required for a long-haul microwave system. On this account, reliability of the system for the long distance circuits is around 90 per cent though short-haul (up to 300 kms.) reliability is 95 to 97 per cent.
2. The system has only a limited channel capacity. All the 120 channels have already been more or less fully utilised on most of the routes.
3. The system does not have stand-by arrangements such as 'frequency diversity' or 'space diversity'.
4. There are still a few gaps in the microwave network. (These gaps have been listed in Annexure A.7.1.

4.3. In view of the above, the Railways would have to take the following steps for improving the reliability of their microwave system to meet their existing telecommunication needs :

1. Hop-lengths between repeater stations should be reduced to about 40 kms. This would require provision of additional repeater stations on many of the routes.
2. Microwave links should be provided on the gaps, listed in Annexure A.7.1.

4.4. *Telecommunication network for OIS††.*—The Government have already decided to computerise freight operation and passenger reservation systems on the Railways. In a computer-linked communication environment, data transmission places an exacting demand on telecommunication facilities, speed and accuracy being its demanding features. This is all the more so because the communication channels have to serve the requirements of real-time functioning. The communication network has, therefore, to satisfy the following requirements :

1. Reliability of each link of the network should be 99.99 per cent.
2. Alternative routing as also automatic switching of circuits, must be provided to cater for any failure of the main circuits.

4.5. The microwave network of the Railways, as it exists today, does not satisfy any of the above requirements. Neither has it the reliability of 99.99 per cent nor does it make available the facility of alternative routing and automatic switching of circuits to cater for the failure of the main circuits. Further, all the 120 channels available in the system have already been fully utilised. The railways' microwave network would, therefore, require complete revamping if it has to support the data transmission channels necessary for the proposed computerisation scheme. Not only the requisite number of additional channels for data transmission would have to be provided, the reliability of 99.99 per cent performance would at the same time have to be achieved by providing automatic switching arrangement and 'frequency diversity' space diversity'.

4.6. We understand that on the basis of some pilot studies carried out on the Northern Railway it has been estimated that a 960-channel microwave system would be required for the main routes, connecting the major cities. On other routes, 300/120 channels microwave systems would be needed. This projection is stated to have catered for a growth in requirement for a period of ten years.

\*Reliability of the communication circuits derived from the overhead line wires rented from the P & T Department was in the range of 60 to 70 per cent. † This is the length between two repeater stations. †† Operation Information System



It has also been suggested that there would be need to drop circuits at several of the repeater stations (spaced at a distance of about 40 kms.) for providing both speech and data communication channels between the stations on the main lines.

4.7. Since communication technology is advancing very fast, it is likely that full expertise in this field may not be available with the in-house planners of the Railways. We, therefore, recommend that the Railways should associate a group of good consultants for drawing up their total communication network plan. While planning the futuristic network, the possible use of fibre optics and satellite communication should also be kept in view.

4.8. With the induction of INSAT\*, a large number of satellite communication channels would become available. We have been informed that the cost per channel through the satellite would compare favourably with that of through microwave links, if the distance between the terminals is more than 1,500 kms. The Railways should, therefore, also consider, in their total telecommunication network plan, the use of satellite communication channels whenever the distance between the two terminals exceeds 1,500 kms.

#### 5.0. Telephone Exchanges and Trunk Boards.

5.1. 'Strowger' type of automatic telephone exchanges have been used on the Railways so far. As mentioned earlier, these exchanges have a number of inadequacies: they can establish only a limited number of simultaneous conversations, they require higher maintenance efforts and when used intensively as on the Railways, they wear out faster than the electronic exchanges†.

5.2. The strowger type of exchanges available from ITI, were designed to satisfy the requirements of the traffic pattern of the P&T Department's telephone system and that also some decades ago. In the civilian environment, the telephones given from the P&T automatic exchanges are generally distributed evenly between the office and business/residential areas. While a large number of calls are made from the telephones provided in offices/business areas during the day hours, the telephones provided in the residential areas are not used as much during this period. Thus, the overall average of the total number of calls made simultaneously is not very heavy.

5.3. On the Railways on the other hand, most of the telephones are given to officials predominantly associated with train operations and the supporting services. As a result, a bulk of them use their telephones simultaneously. The telephone traffic pattern on the Railways is, therefore, such that the telephone exchanges should be capable of setting up a very large number of calls simultaneously and very often keep them going on. This requirement is not fulfilled by the strowger type of exchanges.

5.4. Further, the ITI themselves would soon be phasing out the production of strowger type of exchanges, with the result that it would become difficult to get even the spare parts for maintenance. We, therefore, recommend that the Railways should in future as a matter of policy provide only the latest electronic exchanges. We have been informed that about 60 percent of the existing automatic exchanges of the Railways were provided in the late Fifties and the early Sixties and would

now become due one after another for replacement within the next about five years. Replacement of these exchanges should be undertaken by electronic exchanges only.

5.5. Electronic exchanges are of two types—'analogue' and 'digital'. Analogue exchanges were developed in the late Sixties and they use computers for control of the switching network, comprising cross-bar, cross-point or reed relay electro-mechanical components. Digital exchanges, which were developed in the late Seventies, also employ computers for control of the switching network, which, however, use solid state digital circuits for the switching matrix and for interfacing with trunks, junctions, etc. Digital type of electronic exchanges, therefore, not only provides all the advantages and facilities available with analogue type of exchanges, but also have a number of other advantages and facilities.

5.6. This subject was also considered in depth by the Sarin Committee on Telecommunications, which submitted their Report to the Government in 1981. The advantages of digital exchanges over electronic exchanges listed by the Sarin Committee are as under ‡:

- “(i) Significantly lower building space requirements.
- (ii) Greater simplicity and flexibility in network application.
- (iii) Considerably lower installation and commissioning effort.
- (iv) Greater possibilities for improving the quality of speech in the telephone network.
- (v) Greater reliability and reduced maintenance.
- (vi) Better possibilities for improving the quality of speech in the telephone network”.

5.7. In view of the above advantages, we further recommend that electronic exchanges to be installed on the Railways should be of the digital type. In this context it may also be mentioned that the Sarin Committee's recommendation that in future only digital exchanges should be manufactured within the country, has already been accepted by the Government.

5.8. At many of the major activity centres like Bombay, Calcutta, Delhi, Madras and Lucknow, the Railways have provided more than one exchanges, located in different areas. Inter-connection among these exchanges have been done using under-ground cable, either laid by the Railways themselves or taken on rent from the P & T Department. The maintenance of these underground cables has been posing serious problems because of the digging of roads which goes on throughout the year by a number of utilities.

5.9. We, therefore, suggest that inter-connection of the Railway exchanges should be done using wireless links, either in microwave band or UHF band, as the case may be depending upon the number of channels required. For this purpose, the availability of line-of-sight paths would have to be surveyed to ensure effective links. It might also be necessary to coordinate with the Town Planning authorities to ensure that such paths are not obstructed by subsequent construction of high-rise buildings.

\* Indian National Satellite.

† The Sarin Committee on Telecommunications, 1981 have gone into this at length in Part II of their Report.

‡ Cf. paragraph 6, of the Second Report of the Sarin Committee on Telecommunications, 1981.



5.10. It was indicated by us in Chapter V that the design of the trunk boards presently used on the Railways imposes a severe limitation on the utilisation of the existing telecom channels. These trunk boards have been designed primarily to serve the traffic pattern of the P & T Department's telephone exchanges and have not been found suitable for the Railways because they lack the following features :

1. Facility is lacking for terminating adequate number of lines (equal to the number of cord circuits). Due to this deficiency, even though a trunk channel is available, the call cannot be put through because of the non-availability of the corresponding junction line between the trunk board and the parent trunk exchange.
2. Facility does not exist for making a long distance trunk circuit by connecting two or more short distance trunk circuits in series, on a 4-wire basis. This facility is necessary because the very pattern of the railway circuits is such that a trunk operator is required to frequently connect a number of short distance trunk circuits to establish a call between two stations, which do not have a direct inter-connection. Such tandem connections, if not done on a 4-wire basis, result in considerable speech loss.
3. Further, there is also no facility on the trunk boards to indicate when such tandem calls are finished so that the operator can release the circuits.
4. For establishing a trunk call, the light indication given to the trunk board at the called-end is not repeated on the trunk board on the calling end. Due to lack of this facility, the operator from the calling end is not sure whether the lack of response from the called-end is due to inattention of the operator at that end or due to any technical fault in the trunk circuit.

5.11. In view of the above, we recommend that the Railways should seriously pursue with the III Ministry of Communication, the question of evolving a suitable design of the trunk board to satisfy the specific requirements of the Railways. These trunk boards should have the following features :—

1. The number of cord circuits and the number of junction lines between the trunk board and the trunk exchange should be equal.
2. Facility for inter-connecting a certain number of short distance circuits in tandem, on a 4-wire basis, for establishing a long distance trunk call between two stations not directly interconnected, should be available.
3. Light display on the trunk board at the called end should be duplicated on the trunk board at the calling end. These indications should be given by using LEDs\*. Use of LEDs is necessary because very often the trunk operators does not attend on account of the indication bulbs having fused.

4. Facility for push button dialling on the trunk board should be available to facilitate the job of the trunk operator. 11-3-86

5.12. We further recommend that the Railways should approach a reputed R & D establishment† and commission a project for developing one or two prototype trunk boards.

5.13. As the number of calls which a trunk operator has to deal with is very high, on account of the very nature of the Railway's working, it is necessary that each trunk board should be provided in an air conditioned separate cubicle. This would eliminate the high level of noise that at present prevalent in the Railway's trunk exchanges and would lead to improvement in the quality of service. The trunk operator should also be provided with a loud speaker for listening to the incoming calls and a throat microphone speaker, so that the inconvenience caused by putting on the head-set for prolonged periods can be eliminated.

5.14. The Railways have not gone in for subscriber trunk dialling (STD) so far. This is probably for the reason that if such a facility is provided, the limited number of trunk channels that are now available, might be cornered by officials who are entitled to lower priority, to the detriment of those officials who are engaged in train operations and have been accorded a higher priority for trunk calls. We recommend that STD facilities should be provided to a limited number of high officials, and officers of the operating and Traction Departments, whose nature of work demands such facility†. This step, besides ensuring a higher level of utilisation of the existing speech channels, would also reduce the workload on the trunk exchanges as well as on the Railway's local exchanges through which trunk calls have to be routed.

5.15. We also note that at present, except for the operating, mechanical (power) and electrical (traction) wings of the Railways, no other department has been provided dedicated circuits for controlling/coordinating the inputs required for train operations or for organisation and directing maintenance efforts for their assets. For such activities, these departments have, therefore, to depend upon the general circuits. With the present arrangement of maintenance teams/officials being spread all over the Division, it becomes extremely difficult for the officers of these departments to communicate instructions, coordinate and liaise the activities of the maintenance teams, and to get the feedback in time. This situation is likely to get further accentuated in view of the anticipated growth in rail traffic. We, therefore, recommend that individual dedicated omnibus types of circuits for the use of maintenance personnel of engineering, signalling and rolling stock departments of the Railways should also be provided.

#### 6.0. Intra-activity centre communication.

6.1. Communication facilities presently existing in many of the Railway yards and other activity centres are not only inadequate but also out-moded. For instance, communication between the officials connected with train operations at many of the major activity centres still continues to be through magneto-telephones. Similarly, paging or paging and talkback loud speakers

\* Light Emitting Diodes.

† This may Indian Telephone Industries (R & D Wing), Telecom Research Centre of the Ministry of Communications, the Electronic Research Development Establishment of the Ministry

of Defence etc.

† Their number for obvious reasons should be limited and subject to the approval of the General Manager of the Zonal Railways and the Chairman, Railway Board.



are being used for providing communication between yard supervisor and his staff. These outmoded facilities are not only cumbersome but also inefficient and are having an adverse effect on the productivity of the staff. We have been informed that in the advanced Railway Systems in foreign countries intra-activity centre communication facilities are provided with the help of portable VHF radio walkie-talkie sets.

6.2. With the rapid advances that have taken place in electronics in recent times, these walkie-talkie sets, which are of pocket size, have not only become cost-effective but also require very little maintenance. We, therefore, recommend that the Railways should gradually switch over to the use of these walkie-talkie sets for providing intra-activity centre communication facilities among the various officials.

6.3. We also note that at present, there are no communication facilities between a control tower/cabin and the driver of a shunting loco, even in concentrated areas of operation like Delhi, Howrah, Salt Cotaurs, Wadi Bander etc. or in big classification yards like Mughal Sarai, Juhi, Bhusaval etc. In the absence of such a facility, the productivity of the shunting loco is very low. We, therefore, recommend that walkie-talkie sets should also be utilized for providing communication facilities between the control/tower/cabin and the drivers of the shunting locomotives. To begin with these may be introduced in the seven largest classification yards commencing from Mughal Sarai in the next Annual Plan.

#### 7.0. Train radio communication.

7.1. We have briefly mentioned this in Chapter V while discussing the Genesis and Growth of telecommunication facilities. The subject, however, is important and deserves a fuller discussion here. The Railways are yet to make a headway in providing communication between : (i) driver and guard of a running train, and (ii) driver/guard of a running train and fixed points like stations and control offices. In view of the introduction of heavier freight trains and super-fast inter-city passenger trains, having composition of upto 22 coaches, provision of this facility has assumed added significance.

7.2. Experience of the British Railways has shown that, besides increasing the element of safety, the facility of communication between the driver/guard of a running train and the control office results in substantial operating benefits, reduction in detentions whenever any engine failure takes place, ease in permitting traffic blocks for maintenance of track/OHE etc.

7.3. When super-fast inter-city trains, such as Tamil Nadu and K.K. Express, were introduced, the Indian Railways did try to provide driver to guard communication. Such communication was, however, provided with magneto-phone through physical wire. This arrangement did not prove satisfactory because of wires getting snapped due to vibrations and the need for shunting of coaches en-route.

7.4. We, therefore, recommend that driver to guard communication should be provided by using VHF radio equipment. Similarly, VHF radio equipment should

be utilised for establishing communication between driver/guard and fixed points such as control offices and stations.

#### 8.0. Telegraph/teleprinter circuits.

8.1. Omnibus type of telegraph circuits called 'main-wire' and 'inter-wire' circuits, inter-connecting important stations with the Divisional and Zonal headquarters exist on the Railways for transmission of service messages. Morse instruments had initially been provided on all these circuits. While majority of the circuits still continue to have Morse instruments, tele-printers have been provided at a few locations by converting some of the long omnibus main-wire circuits into a number of smaller point-to-point circuits. Since working with Morse instruments is tedious, time-consuming and prone to errors, majority of these telegraph circuits are not being efficiently utilised. We recommend that the remaining telegraph circuits should also be gradually converted into teleprinter circuits.

8.2. One of the important functions of the control office is to collect every day information such as availability of wagons, special goods stock, passenger coaches, locomotives etc. from the different yards, loading points and important stations on the Division, for planning and reviewing of train operations. Details of detentions suffered by various passenger trains running on the Division are also collected from the terminating stations or Divisional interchange points, for monitoring their performance and for taking corrective actions where necessary. Collection of this information is presently being done on telephones utilising speech channels. This system of collection of information over the telephones is not only a time-consuming and tedious process, but also requires a large complement of staff and extensive occupation of the speech channels. For example over 40 employees have been posted in the control office of Delhi Division only for collection of this information on telephone. This also unnecessarily locks up speech circuits.

8.3. If this information is collected on teleprinters, the utilisation of the communication channels available with the Railways can be made much more efficient. In this context, it is possible to provide 12 teleprinters circuits over a single speech circuit by installing suitable additional equipment at comparatively little cost. We, therefore, recommend that the Railways should convert some of the speech circuits into teleprinter circuits and utilise them for the transmission of operational, statistical and service information.

8.4. Where the format of the information to be transmitted is such that it would not be possible to transmit it on teleprinter circuits, the Railways go in for 'facsimile' transmission\*.

8.5. This will be very useful in the first instance for transmission of 'operating position' from sub-control offices like Ambala Cantt., Tundla, Varanasi etc. to Divisional control offices at New Delhi, Allahabad, Lucknow etc. respectively, and from the Divisional control offices to the Zonal control offices. Their

\* In this system a special equipment known as 'facsimile trans receiver' is installed on the telegraph circuit. This equipment scans the document placed before it, converts the light and dark areas into electronic signals and transmits them over the circuit. When these signals are received at the other end, the corresponding equipment installed there converts them into electric impulses which are recorded on the electro-sensitive recording

paper.

This paper requires no spray, fixer or any other special handling to achieve storage capability. The copy is permanent and can be easily reproduced by any standard duplicating machine. After transmission, the original document is neither stained nor damaged.



use should be expanded to cover similar other installations of the Operating, commercial, accounts, traction and maintenance departments.

#### 9.0. Conclusions.

9.1. Development of telecom facilities on the Railways, has not been commensurate with the growth in traffic.

9.2. In the absence of a long-term integrated plan, development of telecom facilities have been scattered and un-coordinated.

9.3. It would be necessary for the Railways to frame a long-term plan for the integrated development of telecom facilities to cater to the needs of the expected growth in traffic expected to materialise by 2000 AD.

9.4. For efficient and safe running of heavier freight and super-fast passenger trains, it is necessary to provide continuous communication between the control office and the drivers of these trains. Existing control circuits, derived from either overhead wire lines on the non-electrified routes or underground telecom cables on the electrified routes, are not suitable for providing the facility of direct communication between the running trains and the control office. On the electrified routes for hauling heavier freight trains, higher horse-power locos would be introduced. Also, all electric locos, in future, would be equipped with thyristor control mechanism. Higher horse-power locos or thyristor-equipped locos would cause serious interference with the control circuits provided by underground cables.

9.5. It would, therefore, be necessary for the Railways to replace the underground cables on the electrified routes by radio-relay control communication system.

9.6. Radio-relay control communication system, besides having the capacity to provide larger number of channels, would also have numerous other advantages e.g. facility for direct communication between the control office and running trains, lesser maintenance effort, freedom from pilferage and vandalism, etc.

9.7. On electrified routes where underground telecom cables for control communications system already exists, their replacement, whenever due, should be by radio-relay system.

9.8. On certain non-electrified routes, such as in coastal areas, where overhead line wires are prone to heavy corrosion, or in those areas where there are large-scale thefts of wires, it would also be necessary to use radio-relay control communication system in preference to the existing overhead line wires. Radio-relay system may, however, be provided when replacement of these overhead line wires become due.

9.9. Optical fibre technology is likely to revolutionise telecommunication system in the future. The Railways should keep abreast of the advances that are taking place in this field so as to be in a position to take advantages of the vast potential which this technology might provide. Towards this end, the Railways should instal, as an experimental measure, optical fibre cable communication system on one of their heavy density section.

9.10. To improve the efficiency of the existing microwave system, the Railways should decrease the hop length between repeater stations to about 40 kms. The Railways should also provide microwave links in the gaps which still exist on their microwave network.

9.11. In connection with the computerisation of freight and passenger reservation systems, the Railways would have to completely revamp their existing telecommunication network. Since enough expertise is not available with the Railways on this they should associate a group of consultants for drawing up their total communication network plan. The Railways should also examine possibilities of using optical fibre and satellite communication channels for this purpose.

9.12. Electronic exchanges have a number of advantages over 'strowger' type of exchanges. Digital exchanges are the latest version of electronic exchanges and have numerous advantages over the earlier analogue electronic exchanges.

9.13. The Railways, in future should go in for digital type electronic exchanges.

9.14. Trunk boards used in the Railways are the same which are used by the P & T Department. Since the pattern of telecom traffic prevalent on the Railways is different from that of the P & T. The Railways should have the design of these trunk boards modified to suit their specific requirements.

9.15. For intra-activity centre communications the Railways should go in for the modern electronic walkie-talkie sets in place of the outmoded megneto-phones or paging and talk-back loud speakers.

9.16. For communication between the driver and guard of a running train or between the driver/guard and the control office, radio equipment should be used.

9.17. For transmitting statistical and other services information, the Railways should use teleprinter channel instead of speech channels. Use of teleprinter channel is much more efficient since 12 teleprinter channels can be derived from one speech channel by installing suitable equipment on the circuit.

9.18. Where the format of the information to be transmitted is such that teleprinters cannot be used, 'facsimile transmission system' should be used.

*Annexure A.7.1*

*(Cf. para 4.3.)*

#### Routes on which microwave links have not yet been provided or sanctioned.

1. Igatpuri-Itarsi-Bhopal
2. Mughal Sarai-Gaya-Dhanbad
3. Ratlam-Nagda-Rohal Khurd
4. Baruna-Danapur
5. Itarsi-Narkher
6. Lucknow-Roza-Bareilly-Chandausi-Moradabad
7. Delhi-Rohtak-Jind-Bathinda.



## CHAPTER VIII

### SIGNALLING & TELECOMMUNICATION : WORKSHOPS.

#### 1.0. Introduction.

1.1. To meet the needs of growing traffic, the Railways had embarked, in the early Fifties, on a programme of modernisation of their signalling and telecom systems. As seen by us in the earlier Chapters, this programme has not been able to make sufficient headway. One of the major causes for the tardy progress in this area has been inadequate availability of modern signalling and telecom equipment.

1.2. Shortage of the modern signalling equipment had also come to the notice of the Kunzru Accidents Enquiry Committee, which had recommended\* setting up of a central signalling workshop for manufacture of electrical signalling equipment. In pursuance of this recommendation, the Railway Board undertook development of their existing signalling workshops. They also encouraged Industry in the public/private sector to set up production capacity for modern signalling equipment.

1.3. While reviewing this subject nearly two decades later, the Sikri Accidents Enquiry Committee found that despite the above efforts shortage of electrical signalling equipment continued.\*\* Enquiries made by us revealed that the position in regard to the availability of telecom equipment is even worse. It is, therefore, imperative that immediate action should be initiated by the Railway Board to develop adequate indigenous production capacity, both for the signalling and telecom equipment, so that modernisation of signalling and telecom system can proceed unhindered.

#### 2.0. Signalling Workshops.

2.1. There are seven signalling workshops on the Indian Railways. These were initially set up for undertaking repairs/overhaul of different types of signalling equipment, which, till the early Sixties, used to be procured† almost entirely from Industry including the Public Sector. There was heavy growth in the demand of modern signalling equipment in the Sixties and the Seventies, and the firms which have been hitherto supplying these equipment to the Railways, were not able to meet this demand in full. The Railways had, therefore, to set up facilities to manufacture signalling equipment in their workshops to meet the shortfall.

2.2. Development of the manufacturing capacities in the signalling workshops was, however, not carried out in terms of a long-term integrated plan. Instead, facilities to manufacture different items of signalling equipment were set up in the various workshops as and when the demand for them arose. This has led to a haphazard growth of these workshops. For instance, there is duplication in the manufacture of certain items, and at the same time there are quite a few other critical items which continue to be in short supply.

2.3. Location of the different signalling workshops and the major items of equipment being manufactured by them are indicated in Table 8.1.

Table 8.1

**Signalling Workshops**

S. No.	Location of the workshops	Major items being manufactured
1.	Podanur, Southern Railway.	Axle counters, relays of various types, electric point machines, signalling machines-hand generators, block instruments of various types, control panels, electric point detectors, zinc elements, colour-light signalling units, route indicators, shunt signals, lamp holders, and rodding and cast iron foundations for mechanical signalling.
2.	Byculla, Central Railway	Axle counters, block instruments of various types, colour-light signalling units, route indicators, shunt signals, and calling-on signals.
3.	Gorakhpur, North Eastern Railway.	Point machines, point contactors, control panels, colour-light signalling surface base, route indicators, shunt signals, and roller trestles used in mechanical signalling.
4.	Mettuguda, South Central Railway.	Signal machines, electric point detectors, electric signal reversers, zinc elements, colour-light signal units, colour-light signal surface base, shunt signals, and various items used in mechanical signalling, such as cast iron foundation block, roller trestle, point rodding, lock facing point, lock bar, lock bar clip, lock bar stop, lever frame, of various types, ground frame, lock bar driving attachment, and crank and compensator.
5.	Ghaziabad, Northern Railway.	Electric signal reversers, zinc elements, colour-light signalling units, colour-light surface base, route indicators, shunt signals, and other items used in mechanical signalling such as cast iron foundation block, roller trestle, lock facing point, lock bar, lock bar steps, direct locking top lever frame, ground frame, and lock bar driving attachment.
6.	Howrah, Eastern Railway.	Tokenless instruments of various types and various items used in mechanical signalling such as cast iron foundation block, roller trestle, lock facing point, lock bar and lock bar clip.
7.	Sabarmati, Western Railway.	Electric point detectors, electric signal reversers, colour-light signalling surface base, self-printing ticket machines and other items used in mechanical signalling such as cast iron foundation block, lock facing point, lock bar, lock bar stop, double wire lever frame and lock bar driving attachment.

2.4. In view of the duplication in the manufacturing capacity for some of the items and inadequate capacity for some others, the Railway Board had set up a Committee of officers from the signalling and telecommunication department to examine the existing capacity for various items in these workshops and suggest a scheme for its

\* Cf. Para 133 of Part II of the Report of the Kunzru Accident Enquiry Committee (1963).

\*\* Cf. Para 346 of Part II of the Report of the Sikri Accidents Enquiry Committee (1981).

† Certain sophisticated items of signalling equipment which were not indigenously available, used to be procured through imports.



rationalisation. In their report, submitted in December 1982, this Committee had worked out the annual requirement of the major signalling items *vis-a-vis* the aggregate capacity for their manufacture in the workshops as well as outside. Proposals for setting up additional manufacturing capacity, both in the Railways workshops and the firms in the non-railway sector, have been given by this Committee. These are indicated in Annexure A-8.1

2.5. The annual requirements of the various signalling items worked out by the above Committee, are based on their present trend of consumption. We have earlier in this Report suggested a major programme for modernisation of the signalling systems of the Railways. Among others, our recommendations\* include installation of axle counters in a big way, acceleration of panel interlocking/route relay interlocking works, and provision of automatic warning systems on the high speed routes. These measures would require considerable augmentation in the production capacity. We, therefore, recommend that the Railway Board should carry out a fresh review and work out the requirements of the various signalling equipment needed, in the background of the recommendations made by us. Action to set up additional manufacturing capacity for the additional requirements should then be initiated. Depending upon the type of facilities already existing in the Railway's workshops for manufacturing each individual item and the economies of further expansion of this capacity, the manufacture of the additional quantity of each individual item should be divided between the railway and the non-railway sector.

2.6. *Quality assurance.*—There is at present no uniformity in the quality control measures adopted for the various items being repaired or manufactured in the signalling workshops. While some items like relays and point machines are subjected to a strict quality control at the manufacturing stage both by the staff from these workshops and RDSO, this is not being done for many other items. These workshops do not also have in-house facilities for chemical and metallurgical testing of either the raw materials which they procure from the Trade or their own finished products. In the absence of stringent quality assurance for many of the items, there have been cases of premature failure of these items while in service.

2.7. The need for proper quality assurance in the manufacture of signalling equipment cannot be over-emphasised. This is especially so because the very safety of railway operations depend upon their signalling systems which utilise these items. We, therefore, recommend that in-house infrastructure and manpower for stringent quality control, should be built up in each signalling workshop. For sophisticated items like relays, axle counters, point machines, etc., assistance of RDSO in carrying out stage-by-stage inspection may continue to be obtained. It is neither necessary nor practicable to depend on RDSO for stage-by-stage inspection and quality control for a wide range of equipment, as in that case quantity will make serious inroads on quality and research. These, for the largest spectrum of items, therefore, have to be built up on in-house patterns, and for core and developing items, RDSO's research expertise should be availed of.

### 3.0. Production of electronic/electric items.

3.1. The seven workshops, referred to in para 2.3

above, primarily cater to the needs of repairs/manufacture of various items used in signalling systems, Equipment required for the Railway's telecom systems are procured† from Industry in the public/private sector. A list of the sources of supply of the major telecom items is given in Annexure A8-2.

3.2. In view of the large-scale modernisation of the Railways signalling and telecom systems which is necessary, the requirements of the various types of equipment would grow several-fold. We have already mentioned the requirements of many of items of equipment needed for electrical and mechanical signalling. In addition, there would be a large number of other items of electronic equipment which would be needed for modernisation of signalling and electronic/electric equipment for telecom systems. These have been listed in Annexure A-8.3. It would be worthwhile for the Railways to develop one of their signalling workshops to undertake repairs/manufacture of these items. The signalling workshop at Byculla seems to be suitable for this purpose. This shop has already been undertaking repairs/manufacture of electronic/electric equipment such as axle counters and RE‡ way station/repeater station equipment. We, therefore, recommend that the signalling workshop at Byculla should be expanded/modernised to undertake manufacture/repairs of the equipment listed in Annexure A.8.3. The capacity of this workshop should be adequate not only for meeting the requirement of the Indian Railways but also for possible export of this equipment to other countries.

3.3. It is also seen that the various departments of the Railways have been procuring different types of electronic equipment over the years. The Railways hospital alone have a wide variety of electronic equipment such as X-ray machines, paging system etc. Recently, breathalyser equipment have also been introduced. The railway mechanical workshops are now going in for sophisticated machinery having electronic controls. Ultrasonic flaw detectors are being increasingly used for testing of rails and other railway equipment. It is thus evident that the types and number of electronic equipment in use on the Railways would rise steeply in the coming years. The Railways have so far been depending on Trade for the maintenance of these equipment. This has been a very costly proposition. The Railways would, therefore, be well advised to develop their in-house facilities to undertake repairs of these equipments. We recommend that such facilities should also be developed at the signalling workshop at Byculla which should be converted into a workshop of electronic equipment assembly. It will also do the repairs/manufacture work for some widely used electrical equipment for the Railways.

### 4.0. Conclusions.

4.1. One of the major reasons for the poor progress of the Railways programme to modernise their signalling and telecom systems is the inadequate availability of the various types of equipment needed for this purpose.

4.2. It is imperative that immediate action should be initiated by the Railway Board to develop adequate indigenous production capacity both for the signalling and telecom equipment.

4.3. The seven railway signalling workshops were initially set up to undertake repairs/overhaul of signalling equipment in use on the various Zonal Railways.

\* Cf. Chapter II and III.

† Certain sophisticated items which are either not indigenously available or for which the indigenous production capacity is

not adequate, are arranged through imports.

‡ Railway Electrification.



4.4. In the wake of heavy growth in the demand for signalling equipment, and the inability of Industry in the public/private sector to meet this demand in full, the Railways had to undertake manufacture of these equipment in these workshops.

4.5. Since there was no long-term integrated plan, manufacturing capacity in the signalling workshops was haphazard. There was also not enough quality control. These deficiencies would have to be rectified.

4.6. A Committee of officers from signalling and telecommunication department had, in 1982, worked out the requirement of the major signalling equipment vis-a-vis the aggregate capacity available for their manufacture in the signalling workshops as also the non-

railway sector.

4.7. The requirements of the various signalling equipment worked out by the Committee are however, based on the trend of the existing consumption. In view of the recommendations made by us for modernisation of the signalling and telecom systems on the Railways, these requirements would have to be worked out afresh.

4.8. The Railways have introduced a wide variety of electronic equipment over the years. In the coming years, the types and numbers of these equipment would increase manifold. The Railways should develop the Byculla Workshop as a major unit for undertaking assembly/ repairs of electronic equipment. This workshop should also undertake repairs/manufacture of widely used equipment for electric signalling.

Annexure A.8.1

(Cf. para 2.4,

### Major items for Electrical Signalling-Requirement

Item	Shelf type track relays	Shelf type line relays	3 position relays	QNI & QNAI T relays	QLI relays	K-O relays	QJ I relays	Point Machines	Axle Counter	Tokenless block instrument Podanur type	Tokenless RE type	Tokenless instrument	Double line block instrument	Signal Machines 110V 12 V.	Hand Generator, for point machines	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Annual requirement	5000	6000	400	15000	plug in type 250	20000	400	1600	300	80	20	120	160	150	250	40
2. Podanur	2000	1500	100	8500	250	..	..	250	50	100	..	..	48	150	30	48
Byculla	..	..	..	..	..	..	..	..	72	..	..	24	36	..	..	..
Gorakhpur	..	..	..	..	..	..	..	250	..	..	..	..	..	..	..	..
Mettuguda	..	..	..	..	..	..	..	..	..	..	..	..	..	..	150	..
Ghaziabad	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Howrah	..	..	..	..	..	..	..	..	..	..	24	..	60	..	..	..
Sabarmati	..	..	..	..	..	..	..	..	..	..	3	..	..	..	..	..
3. Non-Railway Sector	2000	2000	100	3500	..	20000	400	1100	79	..	..	250	48	..	100	..
4. Total Production Capacity.	4000	3500	200	12000	250	20000	400	1600	200	100	24	48	144	150	280	48
5. Shortfall in capacity	1000	2500	200	3000	..	..	..	..	..	..	..	42	16	..	..	..
6. Proposed increase in Railway Workshop.	1000	1500	50	..	..	..	..	100	..	..	..	..	..	..	..	..
7. Podanur	1000	1500	50	..	..	..	..	100	..	..	..	..	..	..	..	..
Byculla	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Gorakhpur	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Mettuguda	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Ghaziabad	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Sabarmati	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
8. Non-Railway Sector	..	1000	150	3000	..	..	..	..	..	..	..	..	16	..	..	..



Item	Po nt contractors	Control panels	Electric point Detectors	Electric Signal Reversers	Zinc element	CLS Units	CLS Transformers	CLS Surface	Route Indicators	Shunt Signal Position type	Calling on Signal	Lamp Holders	T-2 locks electric lever locks-	Self Priting Machines.
	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Annual requirement of Railways	1600	100	1600	2300	3 lacs	2500	7500	2500	250	500	50	10000	..	20
<b>Production capacity Railway Sector</b>														
Podanur	..	36	60	..	0.25 lacs	600	1200	200	50	120	..	2000	..	..
Byculla	..	..	..	..	..	300	900	..	70	120	120	..	..	..
Gorakhpur	480	50	..	..	..	..	..	600	40	100	..	..	..	..
Mettuguda	..	..	240	500	1.2 lacs	200	..	300	..	60	..	..	..	..
Howrah	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Ghaziabad	..	..	..	360	0.05 lacs	200	..	200	25	300	..	..	..	..
Sabarmati	..	..	300	60	..	..	..	1000	..	..	..	..	..	..
Non-Railway Sector	1100	30	400	800	0.09 lacs	..	3000	200	..	..	..	8000	to be produced from trade only.	24
<b>Total Production Capacity</b>	1580	116	1000	1720	2.40 lacs	1300	5100	2500	185	700	120	10000	..	..
Shortfall in capacity	..	..	600	..	0.60 lacs	1200	2400	..	65	..	..	..	..	..
<b>Proposed Increase Railway Sector</b>														
Podanur	..	..	..	..	..	600	300	..	..	..	..	1000	..	..
Byculla	..	..	..	..	..	600	600	..	..	..	..	..	..	..
Gorakhpur	..	..	..	..	..	..	..	..	20	..	..	3000	..	..
Mettuguda	..	..	260	..	1.2 lacs	..	..	..	..	..	..	..	..	..
Ghaziabad	..	..	..	360	..	..	..	..	35	..	..	..	..	..
Howrah	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Sabarmati	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Non-Railway Sector	20	..	340	220	..	..	1500	..	10	..	..	..	..	..

†Major items for Mechanical Signalling Requirement vis-a-vis availability

Item	Semaphore Signal	Foundation C.I.	Roller Trestle Complete	Point Radding (Solid)	Lock Facing Point	Lock bar 3-section	Lock Bar Clips	Lock Bar Stops	Double Wire Lever Frames	Direct Locking Lever Frame.	Catch handle type frame	Ground Frame	Lock Bar Driving Attachment.	Cranks and compensators
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Annual requirements of Railways.	500	10000	20000	25000	1800	3000	10000	4000	1320	500	700	320	7000	12000
<b>Production capacity Railway Sector.</b>														
Podanur	..	1200	..	2000	..	..	..	..	..	..	..	..	..	..
Byculla	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Gorakhpur	..	..	2000	..	..	..	..	..	..	..	..	..	..	..
Mettuguda	..	1800	7000	12000	400	900	10000	1400	360	..	400	120	1000	10000
Ghaziabad	..	1000	4200	..	300	240	..	1200	..	500	..	120	200	..
Howrah	..	240	1800	..	240	100	1800	..	..	..	..	..	..	..
Sabarmati	..	600	..	..	400	700	..	1500	960	..	..	..	600	..
Non-Railway Sector	200	2500	..	13000	..	500	..	..	..	..	300	..	1200	2000
<b>Total Production Capacity</b>	200	7340	15000	25000	1340	2440	10000	100	1320	500	700	240	3000	12000
Shortfall in capacity	300*	2600	5000	Nil	460	560	Nil*	Nil	Nil	Nil	Nil	60	4000	Nil
<b>Proposed increase Railway Sector.</b>	Nil	..	5000	Nil	460	..	..	Nil	..	..	..	80	3000	..
Podanur	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Byculla	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Gorakhpur	..	..	..	..	..	500	..	..	..	..	..	80	..	..
Mettuguda	..	..	..	..	100	..	..	..	..	..	..	..	..	..
Howrah	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Ghaziabad	..	1400	..	..	..	..	..	..	..	..	..	..	1300	..
Sabarmati	..	1200	5000	..	360	..	..	..	..	..	..	..	900	..
Non-Railway Sector	..	..	..	..	..	60	..	..	..	..	..	..	..	..

\* To be made good from assets. \*Change in design required. @Nylonboos bushes used to reduce requirement.



## Annexure A.8.2

(Cf. para 3.1)

## Annexure A.8.3

(Cf. para 3.2)

## Source of supply of the major telecom items

<i>S No.</i>	<i>Item</i>	<i>Source of supply</i>
1.	Screened Telecom Cable	M/s Hindustan Cables Ltde
2.	Multi-pair out-door Telecom Cable.	M/s. Hindustan Cables Ltd.
3.	Other Telecom Cables	Private Manufacturers.
4.	Telephone Exchanges	M/s. Indian Telephone Industries.
5.	Telephone Instruments	M/s. Indian Telephone Industries. M/s. Gujarat Communications and Electronics Ltd.
6.	Teleprinters	M/s. Hindustan Teleprinters Ltd.
7.	Multiplexing equipment	M/s. Indian Telephone Industries.
8.	Control equipment including Supervisory Remote Control.	M/s. Indian Telephone Industries.
9.	H.F. Radio Equipment	M/s. Bharat Electronics Ltd.
10.	VHF Single Channel Equipment.	M/s. Bharat Electronics Ltd. M/s. Electronics Corporation of India Ltd. M/s. Punjab Wirelcss. M/s. Maltron. M/s. Webel.
11.	5-Channel VHF/UHF Radio Equipment.	M/s. Electronics Corporation of India Ltd. M/s. Bharat Electronics Ltd.
12.	60-Channel UHF Equipment.	M/s. Gujarat Communications and Electronics Ltd. M/s. Bharat Electronics Ltd. M/s. Indian Telephone Industries
13.	7-GHZ Microwave Equipment.	M/s. Indian Telephone Industries M/s. Gujarat Communications and Electronics Ltd.
14.	Microwave Antennae	M/s. Electronics Corporation of India Ltd.
15.	Data Modems	M/s. Indian Telephone Industries M/s. Hindustan Teleprinters Ltd.

## Electronic/electric equipment which can be repaired/assembled/manufactured in Byculla Signalling Workshop

1. Last vehicle check device
2. Automatic warning system
3. Continuous automatic train protection systems
4. Hot Box detectors
5. Earth leakage detectors
6. Dragging equipment detectors
7. AC/DC sensors for interlocking of traction supply with signalling.
8. Train describers
9. Train graph recorders
10. Remote control and indication systems
11. Supervisory control system for sub-stations
12. Electronic & wheel slip detector
13. Data acquisition and analysing equipment
14. Performance monitoring and annunciator for multichannel radio relay link.
15. Two-light switches
16. Electronic switching and interlocking equipment
17. Electronic platform train indicators
18. Microprocessor controlled passenger information system
19. Electronic Storage for route switching and control systems for marshalling yards.
20. Speed sensing devices for speed control for running trains as well as in marshalling yard operations
21. Cordless trunk boards and switch boards
22. Solid state relay
23. 4 wire repeaters
24. Terminal amplifiers
25. Leak amplifiers
26. Emergency and portable field telephone equipment
27. Control office equipment for selective calling



## CHAPTER IX

### SIGNALLING & TELECOMMUNICATION : ORGANISATION AND RESOURCES

#### 1.0. Introduction.

1.1. As mentioned by us earlier, there have been phenomenal technological advances in the field of signalling and telecommunication during the last three decades. The Railways in the developed countries have made use of these advances to modernise their signalling and telecom installations. This has helped them in improving the productivity of their networks substantially.

1.2. Our Railways made an effort in this direction in the early Fifties. However, due to various reasons, mainly shortage of funds, lack of will to give this area appropriate priorities and certain organisational inadequacies, these efforts made no significant headway. As a result, system efficiency and quality of service of our Railways continue to be low in comparison with the Railway Systems in many foreign countries.

1.3. We propose to discuss in this Chapter the measures which must be adopted if the pace of modernisation of signalling and telecom installations in our Railways has to be stepped up.

#### 2.0. Funds.

2.1. Signalling and telecom works, unless they form an integral part of the major developmental projects like Doublings, Gauge Conversions, Electrifications, etc. are financed from the funds available under the plan head 'Signalling and Telecommunication'. This plan head covers not only works relating to the creation of new assets, but also replacement of the existing assets, which have outlived their normal life. Funds available, year-wise, under this plan head for the period 1979-80 to 1983-84 are shown in Table 9.1. (page 201).

Table 9.1

**Availability of funds under the plan head 'Signalling and Telecommunication'**

Year	Availability of funds (in crores of Rs.)		
	Original Estimate	Revised Estimate	Actual Expenditure
1979-80	20.44	19.86	18.08
1980-81	20.00	20.21	22.69
1981-82	19.91	25.02	27.97
1982-83	25.19	30.60	...
1983-84	35.32	...	...

2.2. We note that even though they were short of funds, the Railways were not able to utilize even the meagre allocation available to them under this plan-head in 1979-80. Position in this regard has, however, improved thereafter.

2.3. Further, even though funds provided under this plan head have substantially increased during the five

year period under review, they have remained short of the actual requirements. The extreme inadequacy of funds can be gauged from the fact that the Railways have still not been able to complete even the installation of basic signalling devices\* which are essential for safety of train operations. Other signalling and telecom. works such as provision of multi-aspect signalling, tokenless working, automatic signalling, panel interlocking, route relay interlocking, etc. which are necessary for optimising usage of track and rolling stock have made little or no progress. A large number of signalling and telecom. works approved more than ten years ago have not yet been completed for want of funds. A list of such works is given at Annexure A.9.1 (Pages 207 to 214).

2.4. This is self-defeating. A recent World Bank Appraisal Report (April, 1980) indicate very correctly that if the options are between a few additional diesel/electric locomotives or modern realtime telecommunication system on a trunk route, the Railways must unhesitatingly opt for the latter. We fully endorse this view.

2.5. It is, therefore, imperative that allocations under the plan head 'Signalling and Telecommunication' are increased several-fold. At this stage we have not attempted to make a precise estimate of the requirement of funds under this plan head. This will be done, as for other Parts, in a subsequent Report on 'Resource Mobilisation', wherein the requirement of resources for implementing the recommendations made by us in our various Reports, would be quantified, taking due cognisance of the internal mobilisation of resources by means of economies and systems improvements in efficiency and productivity on the basis of our recommendations.

2.6. We consider that as for 'Track Renewals, it is essential to set up a separate plan head, (as distinct from Signalling and Telecommunication) for 'Renewals and Replacements of S & T Assets : this has suffered extensively in the past, as within the lean budget allocations for Signalling and Telecommunications, not many renewal or replacement works could be accommodated, most of which got seriously delayed or elbowed out by developmental projects. The Railways must bring an end to this unsatisfactory situation, and the Government should not only set up a separate plan head for renewal and replacement and make adequate allocations thereto not at the cost of the main plan head) but also operate this under procedure similar to that adopted for Track Renewals. We consider this essential and integral to the safety and efficiency of the Railway system.

2.7. When we recommended in Part IV of our Report on Railway Reserve Funds that the annual provision to DRF should be increased to Rs. 1,100 crores we had also taken the requirement of renewal and re-placement of S & T assets into consideration.

\* Cf. Paragraph 4.4, Chapter II.



### 3.0. ORGANISATION INADEQUACIES

3.1. We have, in the earlier Chapters, referred\* to the lack of centralised planning in the area of signalling and telecommunication on the Railways. In the absence of a long-term integrated plan, development of signalling and telecom facilities on the various Zonal Railways has not been uniform. For instance, North Eastern and Southern Railways, which carry less traffic, have developed comparatively better telecom facilities than the Eastern and South Eastern Railways, which carry a much higher level of traffic. Such distortion could have been avoided had the Railway Board framed a long-term integrated plan for the development of signalling and telecom facilities. This state of affairs, in our view, is on account of the weakness of the existing machinery in the Railway Board for planning and monitoring developmental activities and specially in the area of signalling and telecommunication.

3.2. At the Railway Board level, signalling and telecommunication disciplines are under the charge of Member, Engineering. The main function of this Member is to look after matters connected with the civil engineering discipline. This arrangement has been in vogue since the inception of Railway Board in 1905. In the earlier times, when civil engineering as well as signalling and telecommunication technologies were relatively simple, it may have been possible for the Member, Engineering, to deal with these disciplines satisfactorily. With the advances which have taken place in the field of signalling and telecommunication as well as civil engineering in the recent past, this arrangement is no more considered suitable. Besides, due to heavy growth in rail traffic over the years, there has been considerable increase in the workload of the Member, Engineering, who is no more able to devote adequate attention to the subject of signalling and telecommunication. It was in this background that the Sikri Accidents Enquiry Committee had recommended strengthening of the signalling and telecommunication department at the Railway Board level. An extract from the Report of this Committee is reproduced below :—

“We recommend that with a view to inject a sense of urgency and appreciation of the impact of signalling on safety and efficiency of train operation, and evolve measures for speedy implementation of such projects on a planned basis, the decision making body in the Railway Board needs to be strengthened at the appropriate technical level”\*\*

3.3. How exactly the strengthening of the signalling and telecommunication department at the highest echelon in the Railway Board should be arranged, is a matter for in-depth scrutiny. We would give on the our recommendations on this subject while considering organisation of the of Railway Board, in a later Report.

3.4. Under the present arrangement, there is a Directorate of Signalling and Telecommunication to assist the Member, Engineering on matters relating to these disciplines. As already stated, the subjects of railway signalling and telecommunication have witnessed phenomenal advances in the recent past. The Railways are

also proposing to undertake computerisation of freight operation and passenger reservation systems. This would require complete revamping of the existing communication facilities of the Railways. It would no more be possible for a single Directorate to cope with the workload of railway signalling as well as telecommunication. One solution to this may be splitting up of the existing Signalling and Telecommunication Directorate in the Railway Board into two Directorates, one for Signalling and the other for Telecommunication. We would, however, consider this subject further in our Report on Organisation.

### 4.0. CONCLUSIONS

4.1. The Railways in the developed countries have modernized their signalling and telecom installations. This has helped them to optimise the utilisation of their track and rolling stock, and also to improve the quality of their service to the customer while we have allowed ourselves to stagnate.

4.2. Signalling and telecom works, excepting those which form an integral part of the Doublings, Gauge Conversions, Electrifications and similar other major developmental projects, have greatly suffered from inadequacy of funds.

3.7 Even the minimum signalling works which are essential for the safety of train operation, have not yet been completed. A large number of works which were approved more than ten years ago still remain incomplete on account of paucity of funds.

4.4. Funds under the plan head ‘Signalling and Telecommunication’ would, therefore, require to be increased several-fold.

4.5. Renewal and Replacement of S&T Assets should have a separate plan head to which adequate allocations should be made, and this should be operated on the same lines as the plan head for Track Renewals. Our recommendation in Part IV to raise the provision for DRF to Rs. 11,100 crores annually includes the requirements of renewal and replacement of S&T assets.

4.6. Apart from shortage of resources, lack of central planning has been another factor responsible for a lopsided development of signalling and telecom facilities. This has mainly been due to the weakness of the machinery in the Railway Board responsible for planning and monitoring the development of signalling and telecom facilities.

4.7. In the present arrangement, Member, Engineering, whose main job is to deal with matters relating to civil engineering, is also in charge of the disciplines of signalling and telecommunication. This arrangement appears inadequate under present conditions. Our precise suggestions in this regard would be spelt out in a later Report on ‘Organisation’.

4.8. The existing omnibus Signalling and Telecommunication Directorate in the Railway Board is no more able to cope with the increased work load in these two disciplines, particularly in view of the wide perspective changes in telecommunication. One solution may be to split up this Directorate into two functional Directorates, one for Signalling and the other for Telecommunications. This subject would, however, be discussed in a later Report on ‘Organisation’.

\* Cf. Paragraph 1.2, Chapter VII.

\*\* Cf. Paragraph 349 of Part II of the Report of Sikri Accident.



**Annexure A-9.1**  
**(Cf. Para 2.2)**

**List of Signalling & Telecommunication Works  
which were sanctioned in 1974-75 or earlier  
and which have still not been completed.**

Name of work	Year in which included in the Works Programme	Estimated Cost (Lakhs of Rs.)	Progress upto 31-3-83
1	2	3	4
<b>Northern Railway</b>			
1. <i>Ghaziabad-Saharanpur section.</i> —Provision of panel interlocking at Deoband, Telheri Buzurg and Rohana-Kalan, in replacement of old and worn out signalling of gears, and MACL at Tapri, Bamenheri and Nangal.	1974-75	72.71	44%
2. <i>Ghaziabad-Tundla section.</i> —Provision of panel interlocking at eight stations :— (1) Maripet, (2) Dadri (3) Wair (4) Chola (5) Sikandarpur (6) Danwar (7) Daudkhan (8) Mitawali.	1974-75	46.30	24%
3. <i>Firozpur Division.</i> —Replacement of signalling gears and providing centralised operation at four stations, viz., Mananwala, Butari, Beas and Hamira.	1973-74	33.69	86%
4. <i>Muzaffarnagar.</i> —Replacement of signalling gears with centralised operation of points.	1972-73	13.92	55%
5. <i>Allahabad Division.</i> —Replacement of worn out signalling gears at Dankaur, Khurja, Firozabad and Etawah.	1972-73	8.99	70%
6. <i>Delhi-Mughalsarai Section.</i> —Provision of automatic train control on (for mail/express trains).	1970-71	70.00	Nil
7. <i>Jaitipur.</i> —Provision of panel interlocking in replacement of old and worn out signalling gears.	1974-75	9.51	52%
8. <i>Rura.</i> —Provision of panel interlocking in replacement of old and worn out signalling.	1974-75	11.09	86%
9. Replacement of signalling cabin in goods area and coaching yard at ten stations. (1) Darazpur (2) Sarai Banjara (3) Chawapail (4) Sadhoo-garh (5) Khanna (6) Sirhind (7) Mandi Gobindgarh (8) Doraha (9) Dhandari Kanan (10) Sanchwal.	1972-73	16.55	90%
10. <i>Delhi-Ambala Section.</i> —Replacement of DW operation of points and locks by point machines at six stations viz., Badli, Holambi Kalan, Mohri, Gharaunda.	1974-75	9.52	55%
11. Provision of multi-channel microwave communication between New Delhi-Bikaner.	1970-71	291.79	26%
12. <i>Delhi-Bhatinda Section.</i> —Provision of departmental line wires with 4 Aluminium Conductor Steel Reinforced (ACSR) and 6 iron wires.	1973-74	79.39	80%

	1	2	3	4
13. <i>Firozpur Division.</i> —Replacement of worn out signalling gears at Ladhawal.	1972-73	4.66	80%	
14. <i>Phillaur.</i> —Replacement of old and worn out Singal & Telecommunication gears including cabin building.	1971-72	3.51	80%	
15. <i>Dehradun.</i> —Additions and alterations in connection with coaching facilities.	1973-74	2.71	73%	
16. <i>Bikaner.</i> —Provision of coaching terminal facilities in the yard.	1973-74	0.99	6%	
17. <i>Jodhpur Division.</i> —Extension of loops at Kuchaman Road and Sambar Lake and provision of Standard I interlocking.	1970-71	3.71	60%	
18. <i>Bikaner Division.</i> —Garhi Hansaru-Khulilpur Section.—Provision/extension of loops at Palli, Jataula, Jauri, Sampka and Pataudi Road stations.	1972-73	4.81	Nil	
<b>North Eastern Railway</b>				
<i>Gorakhpur.</i> —Expansion of signal workshop for manufacturing 12000 type B Relays annually.	1974-75	15.80	95%	
20. Augmentation of channel capacity of microwave system on Gorakhpur-Lucknow, Lucknow-Katihar and Gorakhpur-Varanasi sections.	1974-75	55.34	95%	
21. <i>Samastipur-Darbhanga.</i> —Provision of Ultra High Frequency Communication sets at Samastipur and Darbhanga.	1974-75	18.33	40%	
22. Provision of Ultra High Frequency communication between Saharsa and Khagaria.	1974-75	22.72	40%	
23. Provision of teleprinter network between Samastipur-Muzaffarpur and Samastipur-Varanasi.	1974-75	1.20	80%	
<b>Northeast Frontier Railway</b>				
24. <i>Badarpur Junction.</i> —Replacement of power lever frame by route relay interlocking.	1974-75	29.97	6%	
25. Automatic replacement of advance starter with one slot for one train on Malda Town-Chamagram (Broad Gauge), 5 stations Kumedpur end, and Barsoi 2 stations.	1974-75	1.12	75%	
<b>Southern Railway</b>				
26. <i>Vellamur-Karaikudi.</i> —Replacement the existing worn out Standard III 2 aspect Lower Quadrant signalling by Multi Aspect Upper Quadrant signalling at 6 stations and 4 Level Crossings.	1974-75	35.49	70%	
27. Provision of Ultra High Frequency spur links between Madras-Guntakal-Katpadi section	1973-74	10.41	85%	
28. Provision of Ultra High Frequency spur links between Olavakkot-Erode section.	1973-74	11.27	50%	
29. <i>Olavakkot-Podanur-Coimbatore section.</i> —Provision of Ultra High Frequency communication link.	1974-75	14.77	50%	



	1	2	3	4		1	2	3	4
30.	Patch doubling and line capacity works on Renigunta-Guntakal section. (Phase I) on Royapuram-provision of link lines to one yard in the other dock of Madras harbour.	1972-73	36.10	40%	42.	Bombay Division.—Kurla Passenger yard: Replacement of 109 number engineering points and fittings and 122 electric detectors.	1974-75	4.04	90%
<b>South Central Railway</b>					43.	Bombay VT-Parel-Kurla.—Provision of additional junction cables by laying junction cables 40 pairs.	1974-75	24.02	85%
31.	Secunderabad.—Provision of microwave link.	1970-71	88.99	37%	44.	Byculla.—Provision of Automatic telephone exchange.	1974-75	24.71	35%
32.	Vijayawada Waltair section.—Provision of microwave link.	1970-71	88.47	30%	45.	Bombay VT-Kurla via Harbour Branch.—Replacement of central office equipment and wayside equipment.	1973-74	1.50	75%
33.	Construction of new Broad Gauge line from Bibinagar to Nadikude (Phase II) between Nalgonda to Nadikude.	1974-75	172.05	60%	46.	Provision of multi channel spur link in section Ahmednagar station (Jeur) to Ahmednagar Railway station.	1974-75	7.51	88%
34.	Parallel Broad Gauge line from Guntakal to Dharmavaram.	1972-73	241.97	75%	47.	Provision of multi-channel very high frequency spur link between Pachmarhi-Junnor Deo.	1974-75	9.93	67%
<b>South Eastern Railway</b>					<b>Eastern Railway</b>				
35.	Adra.—Replacement of existing lever frames and signal gears by electrically operated points and signal from a central cabin.	1973-74	42.97	30%	48.	Provision of Multi Aspect Colour Light signalling on single line section between Habra and Bongaon in replacement of existing semaphore signal at 4 stations.	1974-75	13.72	20%
36.	Kharagpur.—One grid of 3 classification lines at Nimpura marshalling yard.	1973-74	18.93	32%	49.	Provision of Automatic Train Control on Varddhaman-Gaya section.	1969-70	29.54	60%
37.	Provision of directional radio multi channel communication system (microwave) from Kharagpur-Khurda Road.	1971-72	119.80	45%	50.	Sitarampur-Jhailh. section.—Provision of platform track circuiting on Up and Down Main line :— (1) Salanpur (2) Simultala (3) Rupnarayanpur (4) Chittaranjan.	1974-75	2.22	75%
<b>Western Railway</b>					51.	Asansol Division.—Lahabon.—Provision of additional Loop and Down Loop with simultaneous reception and despatch facilities with Hot Axle siding of 120 ft.	1974-75	2.92	20%
38.	Shahibag-Viramgam (Broad-Gauge).—Partial doubling on 4 sections between Sabarmati and Chharodi (34.57 kms.)	1973-74	34.63	85%	52.	Dhanbad.—Remodelling of yard to provide better exit facilities for through goods trains and provision of facilities for new trains between Dhanbad and Patna Junction.	1874-75	13.11	50%
39.	Nagda-Kota section Phase II.—Doubling of Nagda-Ramganj- mandi section.	1973-74	192.37	60%					
40.	Partial doubling of line between Gurla-Kakheri and Alna Ramganjmandi) 104 Kms. on Nagda Lakhar section.	1972-73	162.81	70%					
<b>Central Railway</b>									
41.	Itarsi.—Provision of route relay interlocking.	1974-75	275.26	98%					



## CHAPTER X

### SUMMARY OF RECOMMENDATIONS

#### Chapter I

##### Signalling : An Overview

1. The Railways should frame a long-term strategy for utilising modern signalling techniques for handling the anticipated prolific growth in traffic in the coming decades.

(Para 1.2)

#### Chapter II

##### Signalling For Safety

2. (i) 67 block stations, 23 on the Broad Gauge and 44 on the Metre Gauge, which are still non-interlocked, should be provided with rudimentary interlocking in the next two years.

(ii) Out of the 229 block stations on the Narrow Gauge which are still non-interlocked, rudimentary interlocking should be provided only for those which are not likely to be closed down in the near future, and this within the next two years.

(Paras 2.1 to 2.3)

3. (i) Track circuiting of run-through and other passenger lines at (a) all stations on trunk routes and main lines, and (b) important junction stations on branch lines, is essential in the interest of safety. The Railways should plan to complete this work latest by 31st March 1990.

(ii) Track circuiting of lines should not be confined only between the 'fouling marks', but should also extend up to the block section limits.

(iii) An amount of Rs. 60 crores per year should be allocated to complete the track circuiting programme in the time-frame suggested above.

(iv) Since track circuiting is required essentially in the interest of safety, such works should be charged to 'Capital' independent of their financial implications.

(Paras 3.9 and 3.10)

4. To ensure improved availability of wooden sleepers, the Railways should pay remunerative prices for them to the State Forest Departments who are the suppliers of these sleepers.

(Para 3.11)

5. For utilising concrete sleepers for track circuiting works on a larger scale, the existing design of these sleepers should be further improved to enable their 'unrestricted' use in track circuiting.

(Para 3.12)

6. For track-circuit lengths longer than 450 metres, use of audio-frequency or high voltage impulse track circuits should be considered.

(Para 3.13)

7. For track circuits of two to three rail lengths needed for providing automatic reversers for starter

signals, the Railways should go in for high frequency track circuits which do not require insulated joints.

(Para 3.14)

8. In view of the continuing shortage of wooden sleepers and the unsuitability of the present design of concrete sleepers for 'unrestricted' use in track circuiting, axle counters should be installed in lieu of the conventional track circuiting in a big way.

(Para 3.16)

9. To meet the shortfall in the supply of axle counters from the Railways' own workshops, additional capacity for their manufacture should be developed in public/private sector industries.

(Para 3.10)

10. Provision of axle counters should in future be charged to 'Capital' instead of 'ACSPF'. Normal rules for working out financial returns for works charged to 'Capital' should, however, not be applied in this case.

(Para 3.20)

11. (i) The remaining work of providing safety devices in signalling equipment like 'SM's control over the home/last stop signal', 'one slot one train and one slot one starter facility', 'automatic replacement of starters', etc., should be completed in five years.

(ii) At any station provision of these safety devices should be undertaken in toto and not piecemeal.

(iii) These safety devices should form an integral part of all future signalling schemes.

(Para 4.5)

12. At such of the unmanned level crossings where adequate visibility for road users/train drivers is not available, electronic hooters actuated by approaching trains should be provided.

(Para 5.2)

13. (i) All manned level crossings located in mid-sections should be connected with adjoining stations with telephones during the next five years.

(ii) At those manned level crossings where adequate visibility for train drivers is not available, signals interlocked with level crossing gates should be provided, also in a period of five years.

(Paras 5.6 and 5.7)

14. (i) Inter-signal distances should be based on service braking distances and not emergency braking distances.

(ii) Re-siting of signals on the basis of the results of braking distance trials is a safety measure and should be completed within five years.

(iii) The Railways should take an early decision for equipping the existing BOX/BCX wagons with air brakes as they would continue to be used for running 3,600 tonne freight trains.

(Para 6.9)



15. To prevent pilferage of the field equipment of AWS, the existing aluminium casings of these equipment should be replaced by fibre glass casings on a priority.  
(Para 7.7)

16. (i) AWS should be installed on all suburban sections as also other sections having speeds in excess of 100 km./h.

(ii) In the first phase, to be completed in five years, all suburban sections and other sections having speeds of 120 km./h. or over, should be covered by AWS.

(iii) In the next phase, to be completed in a subsequent period of five years, AWS should be provided on the remaining sections having speeds less than 120 km./h., but in excess of 100 km./h.

(Para 7.8)

17. The Railways should import a few LVCDs of 'proven' design and subject them to intensive field trials. If suitability of these LVCDs for our conditions of work is established, production of this equipment should be taken up by importing the necessary technology.

(Para 8.4)

18. Hot box detectors should be provided on all 'arterial routes' at intervals of 100 kms. within five years.

(Para 9.6)

19. Other hazard detectors like 'dragging equipment detector' and 'open door detector' should be provided on routes where heavier freight trains would ply in future.

(Para 10.4)

20. Semaphore signals should be provided with electric lighting and for this purpose photo-voltaic cell panels should be used in a big way.

(Para 11.4)

### Chapter III

#### Signalling : Profile For The Future

21. To ensure systematic development of signalling facilities on the various categories of routes, an integrated time-bound plan for modernising signalling equipment on these routes should be drawn out and implemented.

(Para 1.4)

22. On such of the single line sections on trunk routes and main lines as are not likely to be doubled in the near future, replacement of the existing token type block instruments, whenever due, should be undertaken only by tokenless instruments.

(Para 2.4)

23. (i) Provision of multi-aspect signalling on those of the stations on the 'arterial routes' which still do not have this facility, should be completed in five years.

(ii) In the next phase, to be completed in a subsequent period of five years, multi-aspect signalling should be extended to all stations on the remaining main lines.

(Para 2.5)

24. (i) Whenever need for splitting up a long block sections for increasing line capacity arises, the Railways should go in for intermediate block signalling (IBS) in preference to manned 'block huts'.

(ii) All existing block huts should be replaced by intermediate block signalling under a phased programme.  
(Para 2.7)

25. (i) All suburban sections should be provided with automatic signalling in a phased manner.

(ii) In the first phase, to be completed in a period of five years, all the remaining suburban sections serving the four metropolitan areas, should be covered by automatic signalling.

(iii) In the next phase, to be completed in a subsequent period of five years, suburban sections serving other major cities like Secunderabad, Lucknow, Kanpur, Nagpur, Bangalore, Bhopal, Jaipur, etc. should be covered by automatic signalling.

(iv) Along with the provision of automatic signalling, the terminals into which these suburban sections lead, should also be modernised expanded so as to remove all capacity constraints.

(Paras 2.11 and 2.12)

26. (i) For augmenting line capacities of the existing double line sections on trunk routes and main lines, the Railways should generally go in for a third track (having signalling for due-directional working) in preference to automatic signalling.

(ii) Line capacity on certain small stretches located between two major junction-stations, on trunk routes and main lines may, however, be augmented by provision of automatic signalling.

(Paras 2.14 and 2.15)

27. (i) Replacement of existing two-cabin mechanical signalling on trunk routes and main lines, whenever due, should be done by panel interlocking.

(ii) On such of the stations where panel interlocking has already been introduced without track circuiting of the reception lines, this deficiency should be made up within two years.

(iii) For verifying complete arrival of trains at stations provided with panel interlocking, LVCD or continuous track circuiting/axle counters in adjoining sections should be installed. Till this arrangement is implemented, complete arrival of trains would have to be verified by sending a pointsman/porter to the guard of the trains and obtaining a certificate from him to this effect.

(iv) Panel interlocking should not be provided on branch line stations or on routes with light traffic.

(Para 2.25)

28. (i) Route relay interlocking should be provided for all junction-stations/terminals on trunk routes and arterial main lines.

(ii) For ensuring automatic verification of complete arrival of trains, LVCD or continuous track circuiting/axle counters in adjoining block sections should form an integral part of route relay interlocking schemes.

(iii) Where route relay interlocking has already been provided without LVCD or continuous track circuiting/axle counters in the adjoining block sections, this deficiency should be made up on priority.

(Paras 2.26 to 2.28)



29. (i) Provision of 'centralised traffic control' does not constitute a substitute for doubling of busy single line sections in our conditions of work. For augmenting line capacity of busy single line sections, the Railways should, therefore, go in for doubling in preference to provision of centralised traffic control.

(ii) For suburban sections serving the four metropolitan cities which are subjected to heavy density/high speed traffic, the Railways should go in for installation of computer-aided CTC.

(Paras 2.36 to 2.39)

30. For suburban sections serving major cities like Secunderabad, Lucknow, Kanpur, Nagpur, Bangalore, Bhopal, Jaipur, etc., 'centralised traffic supervisory system' should be provided.

(Para 2.42)

31. For suburban sections serving Calcutta and Bombay only, where the intensity of traffic is extremely heavy, the Railways should go in for cab signalling.

(Para 2.44)

32. In view of the changing pattern of traffic movement to block rakes, the Railways should make a quick assessment of the major yards which would continue to have work load for marshalling of wagons. At least tow such yards should be taken up for mechanisation every year by the Railways mainly with the objective of eliminating damages to rolling stock.

(Paras 2.48 and 2.49)

33. Mechanisation of yards in addition to mechanisation of humping, should include provision of other facilities like 'automatic wagon identification system', 'in-motion weigh bridges', 'efficient telecom facilities and 'closed circuit television system'.

(Paras 2.50 to 2.53)

34. The Railways should keep themselves abreast of the technological developments that are taking place in the field of electronic interlocking, so as to be in a position to take advantage, as early as practicable, of the potentialities offered by this system.

(Para 2.55)

35. Action should be initiated by the Railway Board to effect necessary improvements in the signalling systems on the 'suburban', 'arterial' and 'other main line' routes so as to attain, by 2000 AD, a profile for signalling systems for these routes as recommended by us.

(Paras 3.2 to 3.4)

36. Since branch lines are expected to carry light traffic at comparatively low speeds, no major signalling inputs need be provided on these lines.

(Para 3.5)

#### Chapter IV

#### Signalling : Monitoring and Maintenance

37. For efficient maintenance of signalling equipment, the Railways would have to arrange adequate supply of spares and tools of proper quality, adequately trained staff and a system of intensive inspection of the equipment.

(Para 1.2)

38. Urgent steps should be initiated to bring down the incidence of signal and interlocking failures, the number of which is very high and the official statistics in respect of which were found to be understated.

(Paras 2.1 and 2.2)

39. A large number of signalling and interlocking failures are not finding their way into records. Necessary steps should be taken by the Railway Board to ensure that all signal and interlocking failures are faithfully recorded.

(Para 2.3)

40. A system should be introduced of carrying out an analysis of all signal and interlocking failures in respect of each station, not only gear-wise but also operator/maintainer-wise. The result of these analyses, indicating the causes of failures and the measures which, if taken in time, would have prevented these failures, should be circulated to all maintenance staff.

(Para 2.5)

41. The Railways should evolve some norms correlating signal and interlocking failures with not only traffic density but also with the number of signalling gears, so that efficiency of the maintenance system can be adjudged.

(Para 2.6)

42. To bring down the number of track circuit failures, following steps may be taken :

1. Improve maintenance of track circuit equipment like batteries, rectifiers, etc.
2. Replace insulated rail joints by glued joints.
3. Improve drainage in the yards.
4. Undertake a sustained drive with the help of RPF and local police to check pilferage of track circuit equipment and other miscreant activities.

43. To wipe out the heavy backlog of overhauling of lever frames and block instruments and to improve the quality of work, following action should be taken :

1. Introduce overhauling operation in at least two shifts instead of one as at present.
2. Frame overhauling programmes in the beginning of each year in consultation with the Traffic Department.
3. Provide adequate time in the working timetables for overhauling under the above programmes.
4. Refix periodicity of overhauling of lever frames taking into account not only the density of traffic but also the type of lever frames.
5. Issue detailed technical instructions to provide guidelines about the data that should be collected on the lever frames and their locking boxes before they are taken out for overhauling.

(Para 4.6)

44. Advantage should be taken of the improved availability of relays to wipe out the backlog in overhauling on a high priority.

(Para 5.2)



45. Shelf-type relays should be gradually replaced by plug-in types. Before doing this, the design of the existing plug-in type relays should be improved to impart to them the same characteristics as of the shelf type, particularly in regard to immunity from induction due to the AC traction equipment.

(Paras 5.5 and 5.4)

46. In view of the practical difficulties involved in disconnecting/reconnecting cables, for carrying out insulation tests by the present method of meggering, earth leakage detectors should be utilised for doing these tests.

(Para 6.2)

47. Visibility of colour-light signalling should be improved by :

1. Provision of automatic voltage stabilisers.
2. Replacement of the existing 25 watt bulbs by 33 watt. bulbs.
3. Using double lenses of improved design, production of which has recently commenced.
4. Taking power from the OHE instead of from the local supply.

(Para 6.3)

48. Bulbs used in colour-light signalling should be lit up in signalling workshops at least for two hours before being installed at site, so as to debug them fully.

(Para 6.4)

49. In view of the numerous inherent deficiencies in the cartridge type fuses presently used in signalling installations, the Railway Board should consider their replacement either by fuses, having failures of 'indicating type' or by MCBs, after carrying out an evaluation of the relative merits of these two alternatives.

(Para 6.5)

50. (i) Due to non-standardisation of the capacity and type of batteries used in signalling installations, there has been a proliferation of the types of batteries presently in use, creating problems in their maintenance. The Railway Board should standardise power supply arrangements for signalling installations.

(ii) At way-side stations, where requirement of power is small, use of photo-voltaic cells for supply of power to the signalling installations may be arranged.

(Paras 6.6 and 6.7)

51. Periodicity of checking the 'interlocking feature for panel/route relay interlocking installations should be laid down, as has been done for lever frames.

(Para 6.8)

52. To discourage maintenance staff from taking recourse to short-cut methods like 'looping' or 'bridging' of relays, during failure of signals or points or track circuits, arrangements such as 'calling on signals' and 'emergency cancellation switches' should be provided.

(Para 6.9)

53. To improve the quality of maintenance of signalling equipment, the system of 'directed maintenance' which is presently used only on some of the suburban sections, should be gradually extended to not only the remaining suburban sections but also to other heavy density routes.

(Para 6.10)

54. (i) To ensure adequate availability of spares of the requisite quality for maintenance of signalling equipment, they should normally be procured only from those firms which have been approved by RDSO.

(ii) Store depots should stock adequate quantity of spares for maintenance purposes.

(iii) Certain signalling items like point machines, signal motors, colour-light signal units, electric detectors, etc., are presently stocked as complete assemblies in the store depots. Spare parts of these equipment should also be stocked in the store-depots.

(Para 7.1)

55. (i) Inspection of signalling equipment should be intensified. A technical circular should be issued indicating the details of the items to be inspected, separately for each type of equipment.

(ii) Periodicity of overhauling should be laid down for equipment such as 'point motors,' 'signal motor's 'electric reversers' 'electrical detectors' etc., for which no norms exist at present.

(Paras 8.4 and 8.6)

56. Detailed instructions should be issued for the guidance of the maintenance staff, indicating the aspects of neglect of maintenance or adjustment which can lead to failure of the signalling equipment on the 'unsafe' side.

(Para 8.7)

57. Responsibility for initial maintenance of various types of equipment should be laid down.

(Para 8.8)

58. (i) The present Signal Engineering Manual as also the Railway Electrification Manual are more like statutory documents, to they do not contain technical, guidelines for the maintenance staff. These manuals should be exclusively revised so as to incorporate detailed technical instructions to provide guidelines for various maintenance schedules.

(ii) Adequate copies of these manuals should be printed, and supplied to every official connected with signalling installation right up to the maintainer's level.

(Paras 9.1 to 19.3)

## Chapter V

### Telecommunication : Genesis and Growth

59. Since telecommunication is not only essential for operating the Railways but also constitutes a vital means for improving their productivity, the Railway Board should frame and lay down a long-term programme for upgrading the telecom facilities.

(Para 1.2)

60. (i) The programme of erection of the Railways own departmental overhead line wires should be stepped up.

(ii) In departmental alignments, copper-weld wires should be used instead of ACSR wires.

(Para 3.9)

61. The Railways operations are suffering either due to the absence of their own telephone exchange or



due to inadequate capacities of their telephone exchanges at a number of service/activity centres. They should, therefore, provide their own telephone exchanges at those of the service/activity centres where they do not exist at present and also augment the capacity of those telephone exchanges where it is presently inadequate.

(Para 3.19)

62. (i) In major marshalling yards the existing communication facilities by 'paging'/'paging and talk back' loud-speakers should be replaced by modern walkie-talkie sets.

(ii) Existing magneto type of telephones at the service/activity centres should be replaced by modern type of automatic telephones.

(Paras 3.28 and 3.29)

63. Passenger amenities like electronic train information display systems and public address systems, should be extended to railway stations in all major cities.

(Paras 3.32 and 3.33)

64. For real-time coordination of operational activities, tele-conference facilities should be provided, linking important stations and yards with the Divisional headquarters, Divisional headquarters with the Zonal headquarters and the Zonal headquarters with the Railway Board.

(Paras 4.1 to 4.5)

## Chapter VI

### Telecommunication : Dedicated Facilities

65. (i) On such of the routes where the P & T Department's overhead alignments carry wires exclusively used by the Railways, control and maintenance of these alignments should be transferred to the Railways.

(ii) On those routes where the P & T Department have two overhead alignments, each used both by the Railways and the P & T Department, and where the alignment can be segregated for the Railways' exclusive use, such segregation should be done and the alignment carrying wires used by the Railways should be handed over to them.

(iii) On those routes where such segregation is not possible or where the condition of the wire alignment is unsatisfactory, needing replacement, the Railways should erect their own departmental wire alignments.

(iv) On the routes proposed to be electrified or on the uneconomic branch lines which are likely to be closed down, the Railways should not take over the overhead alignments from the P & T Department.

(Para 3.6)

66. (i) Systems design criteria for the Railways' microwave network and that of the P & T Department's network being entirely different, any attempt to amalgamate them would result in an uneconomic system.

(ii) The Railways should, therefore, continue to have an independent microwave network of their own, installed, operated and maintained by themselves.

(Paras 4.1 to 4.11)

## Chapter VII

### Telecommunication : Profile For The Future

67. Development of telecom facilities in the Railways has been scattered and uncoordinated. The Railways should, therefore, frame an integrated plan for

it not only to cater for the present but also the future levels of traffic.

(Paras 1.2 to 1.41)

68. (i) Radio relay control communication system has numerous advantages over underground cable system in the case of electrified routes.

(ii) On all trunk routes and important main lines which are programmed for electrification in future, the Railways should use radio relay communication system in preference to the underground cables, as part of each individual electrification project.

(iii) On the existing electrified routes where underground telecom cables have already been provided at the time of their electrification, the replacement of these cables, whenever due, should be done with radio relay communication system.

(Para 2.11)

69. (i) On the routes which are not programmed for electrification in the near future, control communication may continue to depend on overhead line wires.

(ii) Exceptions may, however, be made in the case of the routes located in coastal areas prone to heavy corrosion or for those routes which are prone to large-scale thefts of wires due to poor law and order situation.

(Para 2.12)

70. Antiquated equipment such as head-sets/ electro-mechanical devices for selectively calling the stations etc., in use in the control offices should be progressively replaced by modern electronic equipment based on solid state technology.

(Para 2.13)

71. (i) The Railways should keep themselves abreast of the advances taking place in the optical fibre communication technology so as to be in a position to use it as soon as it is practicable to do so.

(ii) The Railways should also instal, as an experimental measure, optical fibre communication system on one of their sections on the heavy density Grand Trunk Route.

(Para 3.3)

72. Performance of the Railways' existing microwave network should be improved by—

1. Reducing the hop lengths of repeater stations to about 40 kms. (This would need provision of additional intermediate repeater stations).
2. Providing microwave links on the gaps which are still existing in the system.

(Paras 4.2 and 4.3)

73. (i) In connection with their proposed computerisation scheme for freight operations and passenger reservations, the Railways would need to revamp their existing telecom network completely.

(ii) The Railways should associate a group of good consultants for drawing up their total communication network plan for this purpose.

(iii) The Railways should also consider use of fibre optics/satellite communication while drawing up their total communication network plan.

(Paras 4.6 and 4.7)



74. In view of the deficiencies in the 'strowger' type of telephone exchanges, the Railways should in future go in for only electronic exchanges of the latest digital type.

(Paras 5.4 to 5.7)

75. (i) At places where the Railways have multiple telephone exchanges, interconnection among them should be arranged with the help of wireless links instead of underground cables.

(ii) To ensure that the availability of line-of-sight paths is not obstructed by future construction of high-rise buildings, the Railways should set up effective liaison with the local Town Planning Authorities.

(Para 5.9)

76. Trunk boards presently used by the Railways are not suitable for their type of telecom traffic. They should seriously pursue, in the way recommended by us, the development of a design of a suitable trunk board which should incorporate the specific features indicated by us.

(Paras 5.10 and 5.11)

77. (i) Each trunk board in a railway exchange should be provided in a separate air-conditioned cubicle.

(ii) Trunk operators should be provided with throat-microphones and loud-speakers instead of the present head sets.

(Para 5.13)

78. STD facilities on the railway telephones should be provided to a limited number of high officials as also such of the officials of the operating and traction departments, whose nature of work justifies this facility.

(Para 5.14)

79. Engineering, S & T and Rolling Stock departments should also be provided with dedicated telecom circuits, (similar to the ones presently available with the operating department), for enabling the former to have effective control/coordination in their maintenance activities.

(Para 5.15)

80. Driver to guard, and driver/guard to control office communication facilities should be provided. For this purpose, VHF radio equipment should be used.

(Paras 7.1 to 7.4)

81. Existing telegraph circuits should gradually be converted into teleprinter circuits.

(Para 8.1)

82. Collection of information by the operating and other control office staff should be done by using teleprinter circuits instead of telephone circuits as at present.

(Para 8.2)

83. Where format of the information is such that it cannot be transmitted on teleprinter, facsimile transmission should be used.

(Para 8.4)

#### Chapter viii

#### Signalling & Telecommunication Workshops

84. The Railway Board should initiate immediate action to develop adequate indigenous capacity for signalling and telecom equipment in their workshops and in the private/public sector undertakings so that modernisation of signalling and telecom systems can proceed with speed.

(Para 1.3)

85. (i) In view of duplication in the manufacturing capacity for some of the items and inadequate capacity for some others, rationalisation of the existing manufacturing capacity of the signalling workshops should be undertaken.

(ii) Requirement of the signalling and telecom equipment should be based not on the existing trend of consumption but should take into account the various recommendations for accelerated modernisation of signalling telecom systems.

(Paras 2.4 and 2.5)

86. (i) Adequate infrastructure and manpower for quality assurance for the repairs/manufacturing jobs undertaken by the Railways' signalling workshops should be arranged.

(ii) For certain specified items like relays, axle counters and point machines, the signalling workshops should continue to obtain assistance from RDSO for inspection of these items.

(Para 2.7)

87. (i) The Signalling Workshop at Byculia should be expanded/modernised to undertake repairs/manufacture of the various types of electric/electronic equipment which is or expected to come into service.

(ii) Capacity of this workshop should be adequate not only to meet the requirements of the Indian Railways but also for possible exports of these equipment to other countries and to meet the needs of other Government Sectors.

(Para 3.2)

#### CHAPTER IX

#### Signalling & Telecommunication Organisation And Resources

88. Annual allocation under the plan head 'Signalling and Telecommunication' may be increased several-fold so that modernisation of signalling and telecom systems can be accelerated.

(Para 2.5)

89. (i) A separate plan head for 'Replacement and Renewal of S & T Equipment', on the lines of 'Track Renewals' should be introduced.

(ii) Adequate allocation (not at the cost of the main plan head) should be made to it. Our recommendations to increase allocation to DRF to Rs. 1100 crores annually already takes into account the requirement of funds for renewal and replacement of S & T equipment.

(Para 2.6)

90. In order that the subject of signalling and telecommunication receive their due importance, the signalling and telecommunication department at the highest echelons should be adequately strengthened.

(Paras 3.1 to 3.4)

Sd./-  
Prof. Ravi J. Matthai

Sd./-  
Russi Mody

Sd./-  
H.C.P. Tripathi

Sd./-  
Dr. S.K. Ray (Secretary)

Sd./-  
V.P. Sawhney

Sd./-  
M. Satyapal

Sd./-  
H.C. Sarin (Chairman)





सत्यमेव जयते

भारत सरकार Government of India  
रेल मंत्रालय Ministry of Railways

**REPORT**  
**OF**  
**THE RAILWAY REFORMS COMMITTEE**



सत्यमेव जयते

Part XI

**ECONOMIES**

OCTOBER, 1983





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## INTRODUCTION

To enable the Railways to handle the prolific growth of traffic anticipated during the next two decades, very considerable resources are required to meet this challenge both for rehabilitation and development.

The resources thus required to be mobilised, however, are so expensive that the Railways also need to seriously control their expenditure so that the system picks up resilience and much increased productivity to release adequate funds for rehabilitation and development.

It is in this context that expenditure control becomes integral to resource mobilisation. While the need for cost-based fare and freight structure has to be accepted, the Railways cannot resort to continual price-hikes to tide over an inefficiently spendthrift performance.

We, therefore, consider that expenditure control in the context of our Railways should assume much greater importance, and should indeed become an act of faith. It was considered that not only should we identify the areas of weakness and vulnerability in important facts of railway performance like traction, staff and stores, and delineate areas of recurring liability like uneconomic branch lines and moribund services, we have also simultaneously to explore how best could the Railways develop

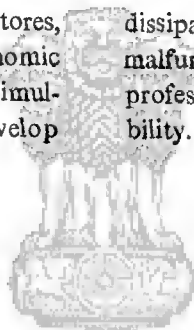
and practise in these principal sectors of performance, a strategy for controlling expenditure.

The result is a full discussion on 'Economies.

We do not say that we have covered all possible areas where economies are indicated, but we have endeavoured to analyse the principal representative sectors. We believe that this analysis should serve to reorient the management towards positive measures.

In this context only sincere pragmatic remedial measures can solve the major problems. It is in this background that the slow response to our recommendations should be viewed by the management and appropriate measures adopted for positive action.

What we have recommended in this Report are our suggestions for bringing about expenditure control on the Railways, while the earlier Reports do embody some strategies designed to make the system proper. It is, therefore, for the Railways to decide on its options : whether it should allow the system to stagnate and dissipate, by drift, routine, spendthrift measures and malfunctioning, or to blossom out and prosper, with professionalism, accountability, profitability and viability.



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## CHAPTER

### OVERVIEW

#### 1.0. Introduction.

1.1. We have already mentioned\* that apart from rationalisation of fares and freight, the Railways would have also to identify uneconomic branch lines which have posed a drag on the finances of the Railways without conferring commensurate benefits to the society, and that wherever there is no prospect of revamping them into economic lines, the Railways would have to take serious steps for their closure. We also stated that a number of measures would be necessary to bring down the mounting working expenses, which have been making steady incursions into the surplus.

1.2. We are conscious of the fact that increases in fares and freights alone without a corresponding improvement in the efficiency of operation and reduction in operating expenses, are not likely to carry the Railways very far.

1.3. It is time that the fare and freight structure should have relevance to costs, but it is hardly viable if the rising costs are largely due to a widening base of expenditure because of inefficiency and lack of productivity. As already mentioned\*\* by us, such a step will not motivate the system to take productivity to the desired levels, and will only cause the rail user greater discontent. When that happens, efficiency will be the casualty and the system will stagnate. We have, accordingly, recommended that to achieve the optimum level of performance, the Railways will have to take strong measures on all fronts, including much fuller utilisation of assets, economy in fuel and staff etc.

1.4. In the Sixth Five Year Plan, the Planning Commission observed that while tariffs of transport organisation would be suitably enhanced wherever necessary, care would be taken that these increases are not made to cover avoidable fall in productivity, particularly in sectors where the organisation has a monopolistic or oligopolistic status.

1.5. Smt. Indira Gandhi, India's Prime Minister in her inaugural address before the National Development Council on 14 March, 1982 buttressed the need for raising larger additional resources to meet the investments required for the Sixth Plan. She mentioned that 'such mobilisation is not confined to the raising of taxes and revenue, but also reducing non-essential expenditure..

1.6. At the session it was also emphasised that decision-making should be expedited and that there should be a greater delegation of financial and administrative powers,† simplification of procedures, improvement in environment and better maintenance of equipment for augmentation in the usage of installed capacity.

1.7. The inherent inefficiencies of the system cannot be passed on to the rail users in the form of higher fares and freights. Sooner or later, the Railways' efforts to augment their revenues through hikes in fares and freights alone would not only become counter-productive but would also reach a dead-end; beyond certain reasonable increases justified by costs of inputs going up, any increase would finally boomerang on earnings and would eventually lead to increased incidence of ticketless travel and the Railways losing traffic to other more economical and efficient modes of transport.

1.8. The Railways being the largest national undertaking, will have to take the lead and set the tone for others to follow. They will have to generate higher internal resources by ruthlessly cutting down non-essential expenditure and removing all operational constraints which come in the way of higher productivity. They must appreciate that cost control is the key to sound financial improvement and needs to be taken as a positive philosophy of operations.

#### 2.0. Working expenses : trend.

2.1. The working expenses‡ have risen from Rs. 862 crores in 1970-71 to Rs. 3,225 crores in 1981-82 and are expected to further go up to Rs. 4582 crores in 1983-84.

Table 1.1 below gives the figures of working expenses for each financial year from 1970-71 onwards.

Table 1.1

#### Working expenses§

(Rupees in crores)

Financial year	Working expenses
1970-71	862
1971-72	928
1972-73	998
1973-74	1,083
1974-75	1,342
1975-76	1,638
1976-77	1,749
1977-78	1,781
1978-79	1,900
1979-80	2,177
1980-81	2,576
1981-82	3,225
1982-83 (Revised Estimate)	3,946
1983-84 (Budget Estimate)	4,582

\* Cf. Para 16.7, page 37 of Chapter I of Part IV of our Report—'Railway Reserve Funds'.

\*\* Cf. Para 3.2, page 9 of Chapter I of Part VI of our Report—'Fare and Freight Structure'.

† These will be dealt with in a later Report on Organisation.

‡ These exclude payments of dividends but include appropriations to Pension and Depreciation Reserve Funds.

§ These are inclusive of miscellaneous expenditure.



2.2. Thus, the working expenses during the period 1970-71 to 1983-84 would go up by more than five times, the increase is pronounced during the recent period from 1977-78 to 1983-84 when the working expenses would shoot up from Rs. 1,781 crores to Rs. 4,582 crores.

### 3.0. Operating ratio\*.

3.1. The ratio of working expenses to earnings—operating ratio—is considered by the Railways as one of the indices of judging the efficiency of the system in financial terms; the lower the ratio, higher is considered the operational efficiency.

3.2. Table 1.2 below gives the operating ratio of the Railways since 1970-71.

Table 1.2  
Operating ratio

Financial year	Operating ratio (per cent)
1970-71	84.1
1971-72	83.1
1972-73	84.5
1973-74	93.4
1974-75	92.4
1975-76	89.3
1976-77	84.4
1977-78	83.0
1978-79	87.5
1979-80	91.5
1980-81	96.1
1981-82	89.4
1982-83 (Revised Estimate)	88.5
1983-84 (Budget Estimate)	87.5

3.3. The operating ratio, which stood at 84.1 per cent in 1970-71, rose to 96.1 per cent in 1980-81. The expectation of the Railways that they will bring down the operating ratio to 87.5 percent during 1983-84 may not be realised as the current trends in originating loading, revenues and working expenses are indicative of an adverse operating ratio.

3.4. The operating ratio computed as it is, can give a misleading picture of the financial working of the organisation. This is because the working expenses can always be reduced by making inadequate appropriations to the Pension and Depreciation Reserve Funds. This is exactly what used to happen in the past, and for the redressal of which we have made specific recommendations in Part IV.

3.5. Though the position has improved and the Railways have started making higher appropriations to

both Depreciation Reserve Fund and the Pension Fund, still the appropriations made are short of the full requirements. Furthermore the working expenses do not include the payment of dividend and thus do not fully take into account the value of the assets employed to produce a particular level of the transportation service.

3.6. We, therefore, recommend that for the purpose of computing the operating ratio, the working expenses should invariably include :

1. Payment of dividend to General Revenues.
2. Appropriations to the Pension, and the Depreciation Reserve Funds at the level suggested† by us.

3.7. The operating ratio, if worked out in the manner suggested by us, would enable the management to know whether or not the Railways are improving in efficiency or are going down, and would also be indicative of the correct financial position.

### 4.0. Areas of economy.

4.1. We have covered some major areas of economy in this Report. These do not embrace the entire spectrum of working of the Railways.

4.2. The areas delineated are however the principal regions where attention should be focussed for effecting perceptible economy in working expenses. These are indicated in the subsequent paragraphs.

### 5.0. Uneconomic branch lines.

5.1. There were 135 uneconomic branch lines during 1981-82. The loss suffered was about Rs. 40 crores, excluding dividend.‡

5.2. Some of these lines serve areas which are important for promotion of tourism and pilgrimage and some of strategic importance. Most of the remaining lines no longer render any particular advantage as the road services are adequate to meet the full transport requirements or the traffic generated is so slender that it should necessarily go to the less capital-intensive road transport.

5.3. There is a large body of expert opinion which has favoured the closure of these lines and thus to stop the avoidable loss to the Railways and drain on the exchequer. However, the State Governments so far are opposed to closing down of these lines not so much for socio-economic considerations as to avoid the likeliness of any stir of protest, particularly when the losses do not affect their own kitty. The choice before the State Government should, therefore, be either to agree for dismantlement of these lines or to share the operating losses. This needs to be probed on these lines.

### 6.0. Economy on steam traction.

6.1. Until two decades ago, steam was the pre-minent mode of traction on the Indian Railways. Since the Sixties, however, the use of diesel and electric traction progressively increased and the position of steam traction correspondingly dwindled, but not enough.

\* Operating ratio up to 1977-78 was worked out as a percentage of total working expenses plus payment to worked lines to gross traffic receipts. The figures from 1978-79 onwards are worked out by dividing the total working expenses excluding Suspense to total earnings. The change will not, however, make any significant difference.

† Part IV of our Report on Railway Reserve Funds. The level suggested by us is the minimum for reasonably early recovery of the system.

‡ Cf. Appendix XX of Explanatory Memorandum on the Railway Budget, 1983-84.



6.2. We have recommended\* that before the end of this century steam traction should be completely done away with. Until then, however, coal will continue to be part of the fuel bill. The expenditure on coal during 1981-82 was a whopping Rs. 225 crores and steam is now inefficient, expensive and out of date.

6.3. Of all the three tractions, namely, steam, diesel and electric, there is no doubt that steam is the most wasteful and vulnerable to anti-social mischiefs. While steam must be phased out of the system as rapidly as possible, Railways will have to ensure that until the last 100 steam locomotives are no its system, waste and crime have to be fought vigorously to save on avoidable expenditure.

#### 7.0 Economy on diesel traction.

7.1. Railways consume nearly a tenth of the total diesel oil consumed in the country. In 1981-82, they consumed 1.2 million kilo-litres of HSD oil, costing Rs. 349 crores.

7.2. Since oil is very costly both in financial and physical terms, no measure of innovation, modernisation and organisational control can be spared to make the best and most economic use of oil.

#### 8.0. Economy on electric traction.

8.1. It is, therefore, the electric traction that holds the future for the Railways. The major brunt of traffic movement, that is almost 90 per cent of goods traffic and 70 percent of passenger traffic movement, will have to be borne by electric traction by the turn of the present century.

8.2. Fortunately, electricity is least amendable to waste or pilferage. Even so with rationalisation of tariffs, greater modernisation, appropriate organisational control and creation of energy consciousness among the employees, it would be possible to achieve substantial reductions in electricity bills.

#### 9.0. Economy on staff.

9.1. With over a million and a half regular employees, Indian Railways are the single largest employer in the country. They do form the bulk of the work force in the organised state sector. In the first fifteen years upto 1965-66, employment on the Railways grew at the rate of 3.2 per cent per annum. Since then it has slowed down to 1 per cent per annum and in 1981-82, it was 0.18 per cent. In absolute terms, however, the roll in the books is expensive, as also the annual accretion.

9.2. This vast manpower is a great asset if properly inspired, motivated and productively employed. In a vast and complex organisation like the Railways, this is no small task. Management should do whatever it can, but in their endeavours, the trade unions should also display a broad-minded, forward-looking approach which is in the interest of both sides.

9.3. Discipline, that comes out of pride in work and identification with the goals and objectives of the organisation, can be achieved only if the management and trade unions fully cooperate. In short, proper, clean and healthy environment for work is necessary to raise the productivity of the vast work force at the command of the Railways.

9.4. Unless, optimisation is imaginatively programmed and relentlessly pursued by management, workers and trade unions in combined endeavours, the prospects can not be bright. It will be poor consolation for each of these parties to say, as the ship sinks, that the leak any way was at the other end of the boat.

#### 10.0. Economy in stores.

10.1. Over a lakh different items of stores are used on the Railways. The Railway operations critically depend upon procurement and timely supply of these materials. Besides, the quality of the materials is also very crucial.

10.2. It is equally important to exercise the strictest possible control on the capital that is locked up as inventory.

10.3. It would be fatal for railway operations if out of any consideration, whatsoever, either the quality of materials is compromised or heavy inventory balances are allowed, resulting in monetary loss and risk of obsolescence, theft, fire etc.

#### 11.0. RCC 1980.

11.1. While we were in the midst of writing this Report, the Railway Convention Committee presented in Lok Sabha on 26 August 1983, their Ninth Report on 'Cost of operation of Railways (Staff and fuel costs)'.

11.2. The Convention Committee have emphasised the need for quicker renewal and replacement of old assets, speeding up of mechanised track maintenance, engaging staff productively, early phasing out of steam locomotives, inspections to be intensified to eliminate losses of coal at the loading point and in transit, installation of electronic weight bridges etc.

11.3. The Railways must pay full heed to the irresistible conclusions reached by RCC 1980.

#### 12.0. Need to revamp the Organisation.

12.1. There is a general reluctance on the part of the management to own deficiencies, weaknesses and vulnerabilities of the system. By and large the approach of the Management has been to defend the 'wrongs' and disown 'failures'.

12.2. The prevarications at all levels of management will not give any impetus or motivate people to improve the system. Only when the management takes a pragmatic and realistic view of the situation and wholeheartedly and earnestly tries to revamp the organisation that hope would lie in the system rising to a higher plane of operational and financial efficiency.

#### 13.0. General.

13.1. While we may not be able to cover all the areas, we believe that our analysis and recommendations in this Report will serve to orient the railway management towards positive measures for effective real-time economy in expenditure.

13.2. Generally speaking every rupee that can be saved must be saved and every minute's delay that can be cut out must be cut. Economy, like peace, is indivisible.

\* Cf. para 4 of Chapter VII of Part II of our Report on Transportation.



It must pervade the entire organisation. As a value, economy is basic to administration : an administration must either uphold economy or flounder without it.

#### 14.0. Conclusions.

14.1. It is accepted that the fare and freight structure of the Railways will have to be cost-based and that the Railways have to produce a surplus to generate resources for rehabilitation and development.

14.2. It cannot, however, be accepted that rises, in fares and freight should be the means to cover spendthrift and run away expenditure in the working of the Railways. The dictates of sound financial management require that together with pragmatism in fare and freight structure, the Railways must also promote objective cost and expenditure control.

14.3. In order that increasing volumes of internal resources are realised to augment allocations towards rehabilitation and development, non-essential expenditure should be ruthlessly cut and operational constraints systematically removed.

14.4. Cost control is an essential key to sound financial management and needs to be taken as a positive philosophy of operations on the Railways.

14.5. In order that the operating ratio portrays an authentic financial picture, this should reckon with payment of dividend to General Revenues and the Appropriations to the Pension and the Depreciation Reserve Funds at the levels recommended by us in Part-IV of our Report on Railway Reserve Funds.

14.6. The Railways should concentrate their attention on certain principal areas susceptible to wide ranges of economy, viz. uneconomic branch lines, traction, staff and stores.

14.7. The usual organisational weakness to shy away from an acceptance of wrongs and failures should be given up. The Railways should make earnest and whole-hearted endeavours to effect economy, organise scientific expenditure control and rationalise and strengthen the system. In this context the recommendations made in this Report should be urgently considered and implemented.





## CHAPTER II

### UNECONOMIC BRANCH LINES

#### 1.0. Introduction.

1.1. We had stated\* in Part II of our Report on Transportation that there were 136 uneconomic branch lines and the loss suffered on these lines was Rs. 32 crores during 1980-81 alone. While no dividend is paid on these lines, the operational losses have proved a burden for the Railways from one Five Year Plan to another. We had accordingly recommended that some of these should be closed down after a review.

1.2. As far as the narrow gauge lines are concerned we had recommended\*\* closure in a phased manner of all such sections except the Central India narrow gauge system and those going to Simla, Jogindernagar, Darjeeling, and Bangarpet. Before closing them it has to be ensured that adequate and efficient road transport services are available to serve those areas.

1.3. Several High Level Committees have in the past gone into the question of closure of uneconomic lines.† We have studied these recommendations and have made our independent evaluation and assessment. After tracing the historical development and the views of the Expert Committees, we will in this Chapter give an appraisal of the problem and formulate our observations and recommendations.

#### 2.0. Historical Development.

2.1. In the initial stages rail development in India was financed to a large extent through capital raised in the United Kingdom by private companies registered there. Around 1890, it was considered necessary to encourage building of branch or feeder lines††. The terms offered in regard to branch lines were liberalised from time to time to encourage private capital to build them.

2.2. Some District Boards were also interested in the construction of the feeder railways‡ in their districts. For this, they either raised the capital from their own resources or offered guarantees to private companies.

2.3. From 1925 onwards, on the recommendations of the Acworth Committee (1924), the previous system was abolished and the Government themselves were prepared to find the capital required for the construction of branch lines. But if such lines were unremunerative, the Government were prepared to construct them only if the authority desiring such lines had agreed to bear the loss.

2.4. Meanwhile, the former princely states were following their own individual policies\*\*\* of rail

development within their domain. By 1949-50, they owned over 11,000 kilometres of track. These lines, as a consequence of federal Financial Intergration, came to be vested in the Central Government with effect from 1 April, 1950.

#### 3.0. Financing of uneconomic lines : Policy.

3.1. The Railway Convention Committee, 1949@ comprehensively reviewed the policy about the construction of unremunerative new lines and came to the conclusion that if the Railways had to fulfil their complementary role in the economic development of the country, they would have to construct lines in underdeveloped areas or in areas inadequately served by rail transport.

3.2. The Committee recommended that such unremunerative lines should be charged to a new Fund called the Development Fund to be fed from the surplus revenues of the Railways

3.3. The allocation rule that an unremunerative line should be charged to Development Fund was changed by the Railway Convention Committee (1954) from 1 April 1955, all new lines, whether remunerative or not, were to be financed from Capital.

#### 4.0. Views of Expert Committees.

4.1. The measures suggested by various expert committees have been discussed hereafter, in respect of specific committees.

4.2. An appraisal of the recommendations of these committees is important as many of them do still have considerable relevance in today's context.

#### 5.0 Indian Railway Enquiry Committee, 1936-37.

5.1. This Committee, with Sir Ralph L. Wedgewood as the Chairman, inter alia recommended that the branch lines particularly those facing stiff road competition should be periodically reviewed to assess whether measures taken, if any, could improve future financial results.

5.2. If not, the Railway Board should decide whether in the interests of the community, the losses involved should be allowed to continue.

5.3. Before any final step was taken, the provincial Governments should be approached to ascertain whether they would be prepared to contribute towards the continuance of such branch lines.

\* Para 18.6 of Chapter II,

\*\* Para 21.8 of Chapter II, of Part II of our Report on Transportation.

† In certain cases the possibilities of bringing about an improvement in the viability of some of these lines have been considered.

†† Some of the Railways constructed under the Branch line Terms which appear in the current list of unremunerative lines are :

1. Darjeeling-Himalayan (New Jalpaiguri)
2. Rupsa-Taland

3. Nadiad-Kapadvanj.

‡ Tirunelveli-Tiruchandur is an example.

\*\*\* These were constructed either through the agency of British Companies or by the States themselves.

§ Some of these are :

1. Jodhpur Railway
2. Saurashtra Railway.

@ This Committee was appointed by the Constituent Assembly of India in April 1949 to review the working of the Separation Convention of 1924.



5.4. The Committee saw no justification for the maintenance of an unremunerative branch line at the expense of the Railways or of the general tax payer. They considered that such services should ordinarily be withdrawn. This applied particularly to narrow gauge lines which, with their speed limitations, were unequal to compete with road transport. The Committee also mentioned that in the general interest the sooner this situation was recognised the better.

#### 6.0. The Committee on Transport Policy and Coordination (1959)\*.

6.1. This Committee recommended closing down of unremunerative branch lines if alternative facilities had been, or were capable of being, developed to a point where the requirements of transport could be met by means other than the Railways and at no higher cost to the economy.

6.2. They stated that in a developing economy, there should be no undue rigidity in regard to the mode of transport so long as the overall requirements could be satisfactorily met.

6.3. The Committee further stated that where road transport had to be expanded considerably to facilitate the discontinuance of the railway line, the Railways, in consultation with the State Governments, could participate or assist in the growth of road transport services.

#### 7.0. The Estimates Committee (1967-68).\*\*

7.1. This Committee endorsed the recommendation made by the Committee on Transport Policy & Coordination.

7.2. The Committee also mentioned that while giving licences or permits for road transport, State Governments should keep in view the broad national interests, and should also extend full cooperation in closing such of the unremunerative branch lines where alternative transport facilities, at almost the same cost to the economy, could be developed to serve the needs of the areas concerned.

#### 8.0. The Public Accounts Committee (1968-69)\*\*\*

8.1. This Committee recommended that the Railways should explore ways and means to reduce the losses on uneconomic lines by introducing optimum number of services, speeding up of trains, conversion of gauge etc.

8.2. Where a State Government was not agreeable to the closure of unremunerative lines, the question of passing on the losses to the concerned Government should be placed before the Railway Convention Committee for their consideration.

#### 9.0. Uneconomic Branch Lines Committee, 1969.†

9.1. This Committee was headed by the then Deputy Minister for Railways, Sri Rohan Lal Chaturvedi, and included three Members of Parliament and representatives from the Planning Commission and the Ministry of Transport.

9.2. The terms of reference of the Committee were :

“To review the existing procedure and policy regarding identification of uneconomic branch lines and measures taken to improve their working and keeping in view the recommendations made by the Committee on Transport and Coordination, the Estimates Committee (1967-68.), Tenth Report (Fourth Lok Sabha) and Public Accounts Committee (1968-69) 49th Report.

“To suggest ways and means of improving the working of the uneconomic branch lines so as to make them economically viable.

“To recommend suitable measures to reduce or eliminate the burden on the Indian Railways of the recurring financial loss of working these uneconomic lines”.

9.3. The Committee recommended that for the purpose of examination of viability, only the following types of lines should be considered as branch lines :

1. All narrow gauge lines
2. Broad gauge and metre gauge lines joined to the main system at one-end† only.

9.4. A branch line is considered uneconomic if it does not yield a return equal to the prevailing rate of dividend.††

9.5. On 18 March 1969 i.e. before the appointment of the Uneconomic Branch Lines Committee, the then Minister of Railways inter alia stated: “I propose not to dismantle any railway line wherever it may exist”. On the strength of this statement, the Uneconomic Branch Lines Committee recommended that the Railways should be directed to take all possible steps to attract traffic and improve the viability of the uneconomic branch lines by adopting measures such as supply of wagons in time, avoiding delay in transshipment, ensure connection with main trains, proper maintenance, speeding up of trains, enforcing stricter checks against ticketless travel etc.

9.6. The Uneconomic Branch Lines Committee attached great importance to the goodwill and cooperation of the concerned States and encouraged by the

\* Initially Shri K.C. Neogy was the Chairman of this Committee. He resigned in January 1964. Sri Tarlok Singh then took over as the Chairman. The Report of the Committee was submitted in January 1966.

\*\* Tenth Report, Fourth Lok Sabha.

\*\*\* 49th Report, Fourth Lok Sabha

† Report submitted in 1970.

‡ Previously lines like Jhansi-Mankapur, which were chord lines joining the rest of the system at either end, were also referred to as branch lines.

†† RCC 1980 in their Report presented to the Parliament on 5 November 1982 have recommended the following rates of divi-

dend for the period 1980-84 :

1. 6 percent on the Capital invested upto 31 March 1980 (inclusive of 1.5 per cent on the Capital invested upto 31 March 1964 for payment to the States in lieu of passenger fare tax etc.)
2. 6.5 percent on the Capital invested after 31 March 1980.

The rates prior to this recommendation were :

1. 5.5 per cent on the Capital invested upto 31 March 1964 (inclusive of 1 per cent for payment to States in lieu of passenger fare tax etc.).
2. 6 per cent on the Capital invested after 31 March 1964.



assurances of the State Governments to make such lines viable, recommended that the losses should not be passed on to the State Governments.

9.7. They also recommended that at the Railway zonal headquarters there should be, for each State, a Committee consisting of the General Manager of the Railway and representatives of the State Governments concerned to review the uneconomic lines periodically and suggest how the State Governments could help improve traffic on such lines. Similar Committees were also to be constituted at the divisional level to establish field-level coordination.

9.8. They also reviewed individual lines and made recommendations for each of them. For instance, they observed that the Satpura Railway (narrow gauge-1,007 kilometres) was a complete narrow gauge railway system and hardly a branch line. The loss on this Railway during 1966-67\* was Rs. 2.27 crores. The Committee were of the view that it was necessary to ascertain the surpluses or deficits for each section of this vast system and, in view of the importance of this network and the differing traffic conditions on its various sections, a Departmental Committee should go into the economics of each section.

9.9. The definition of a branch line proposed by this Committee, as given in paragraph 9.3 (Page 19) has been accepted by the Railways. The Railways have also been making efforts to make the uneconomic branch lines viable. Some of the measures taken in this regard are development of additional traffic by adjustment of railway timetable to suit public convenience, cancellation of trains which are poorly patronised, running of trains during day light only, closure of unremunerative stations, halts or their conversion into contractor-operated train halts, economy in staff, fuel and maintenance, closure of stations for goods traffic as warranted by poor patronage etc. and by persuading the State Governments to provide feeder roads to stations and curtailment of parallel road transport during the time of the train services.

#### 10.0. The Railway Convention Committee (1973)†

10.1. This Committee recommended taking concerted measures in close coordination with the State Governments, trade and industry, to improve the financial results of the branch lines which were marginally unremunerative.

10.2. Regarding the remaining uneconomic branch lines, they recommended that if any such lines were continued indefinitely, the authorities who desired them to be run, should share the unavoidable losses with the Railways.

10.3. In this regard, the Committee noted that in Britain and Canada, the Railways were given grants to compensate them for the losses incurred on unremunerative lines.

10.4. The Committee also pointed out that during the quinquennium 1969-70 to 1973-74, the amount paid to the State Governments as grants in lieu of passenger fare tax and their share of railway safety works, was Rs. 90.0 crores and that, therefore, it was only fair and equitable that the State Governments, who were adverse to closure of uneconomic branch lines, should meet the losses.

#### 11.0. Administrative Reforms Commission.‡

11.1. This Commission recommended \*\*that the Railway Board should consider closure of unremunerative branch lines where adequate alternative modes of cheaper transport existed, and where such closure would not adversely affect the public interest. High level representatives of the State Governments and the railway authorities should try to settle the question of continued running of uneconomic lines taking due note of local considerations. Where running of uneconomic lines was deemed to serve the public interest, the loss should be met out of the public revenues, State or Central.

11.2. The recommendations of the Administrative Reforms Commission were accepted in principle by the Ministry of Railways, who, inter alia, felt that practical difficulties in giving full effect to these recommendations be kept in view before taking out final decision in regard to the closure of any unremunerative line.

#### 12.0. The High Level Committee on Social Burdens (January, 1978)§

12.1. This Committee saw no reason to continue uneconomic branch lines and recommended that the Ministry of Railways should address the State Governments once again to agree to the closure of uneconomic branch lines within six months or agree to fully reimburse the losses incurred by the Railways in running them.

12.2. In case no reply was received from any State Government within six months, losses should be fully reimbursed by the central Government to the Ministry of Railways.

12.3. To begin with, the reimbursement of losses was to be pegged to the figure of losses during 1977-78.

#### 13.0. The National Transport Policy Committee (NTPC) (April, 1978).††

13.1. This Committee recommended closure of the uneconomic branch lines as they acted as a drag on the financial viability of the Railways. The Committee stated: "The only exception could be such lines on broad and metre gauges which in the form of short spurs might serve as alternative routes to relieve congestion by connecting them to suitable points on existing routes either as they are or after conversion."

13.2. Regarding the narrow gauge systems, NTPC had recommended that except for retaining the Central India narrow gauge system and some hill sections for their engineering skills and promotion of tourist traffic, the narrow gauge lines should be closed down in a phased manner. Before closing these lines, it should be ensured that adequate and efficient road transport services are available to serve those areas.

13.3. The Committee had also recommended that a systems approach could be adopted where the conversion of narrow gauge lines to either metre or broad gauge would form part of the network and was justified on the basis of the traffic potential for the system.

\* The year for which latest figures were available to the Committee on Uneconomic Branch Lines.

† Report submitted in October, 1975.

‡ Report submitted in January, 1970.

\*\* In their Report on Railways (November, 1968)—Recommendation No. 259.

§ Report submitted in January, 1979.

†† Report submitted in May, 1980.



#### 14.0. Appraisal.

14.1. The subject of uneconomic branch lines has been a cause for concern to the Government for more than three decades. Various Expert Committees have been appointed to suggest ways and means to solve this ticklish issue. The Uneconomic Branch Lines Committee 1969, was the lone expert body which did not recommend pulling out of uneconomic branch lines nor did they agree that losses be passed on to the State Government. Instead the Committee relied upon the goodwill and cooperation of the State Governments in improving the viability of the lines.

14.2. There was, however, a general consensus amongst all other Expert Committees including the Parliamentary Convention Committee of 1973 and the National Transport Policy Committee of 1978, that uneconomic branch lines should be closed where the overall transport requirement could be met by road transport.

14.3. Most of them also suggested that where such lines were to be continued their financial viability should be improved, and the authority interested in their continuation should bear the working losses.

14.4. While there is no significant change in the number of uneconomic branch lines from year to year, the losses suffered by the Railways in operating them have been steadily mounting. The operating loss has thus gone up from Rs. 21 crores in 1977-78 to Rs. 40 crores in 1981-82. Table 2.1 below gives the year-wise number of uneconomic branch lines and the losses incurred thereon from 1977-78 onwards.

Table 2.1

#### Number of uneconomic branch lines and losses\*thereon

Year	Number of lines	Loss Rupees in crores
1977-78	126	21
1978-79	131	27
1979-80	132	27
1980-81	136	32
1981-82	135†	40

Source : Explanatory Memoranda 1979-80 to 1983-84.

14.5. The pace at which the loss is going up from year to year is shown in the graph at page 27.

14.6. We find from the Railway Budget documents @ (1983-84) that they had identified 23 uneconomic branch lines as fit for closure and had taken this up with the State Governments concerned seeking their consent to the closure of these lines. None of the State Governments has, however, agreed to the closure.

14.7. We also find that the Railway Board had undertaken a fresh review to isolate the lines where alternative means of transport exist or can be developed for closing them down. After conducting this review, the Railway Board have indicated to us that 54 branch lines can be considered for closure. The capital cost of these 54 lines is Rs. 22.4 crores and the operating losses incurred on them in 1981-82 amounted to Rs. 9.9 crores. The

State-wise particulars of these lines are given in Annexure A.2.1.

14.8. We appreciate that the issue of uneconomic branch lines is no simple matter. This is a highly complex, intricate and a multi-faceted problem, which has defied solution so far because State administrations are opposed to giving up an asset towards which they do not have to contribute anything.

14.9. The issue of uneconomic branch lines figured in our discussions with the State Governments. Their spontaneous reaction was that these lines should not be dismantled and should continue to be run for the convenience of the public and that the losses on these lines should also be borne by the Railways. In fact even in sections where the Railways have discontinued functioning, the State Governments are opposed to uprooting the rails.

14.10. We do recognise that uprooting of a railway line is not welcome by the people of the area who are used to a particular rail facility. We also anticipate that such a course of action may result in loud protests in the local or regional press, Legislative Assemblies and in the Parliament, but at the same time it is difficult in the overall national interest to ignore the fact that the operating losses on such lines is a restraint on the Railways' efforts at resource mobilisation.

#### 15.0. Our observations and recommendations.

15.1. We have considered all these aspects and have also gone through the views expressed by the Railways. After deliberating on this none-too-easy a problem we have classified the branch lines considered uneconomic by the Railway Board into the following four categories :

Category	Number of lines	Aggregate kilometrage	Aggregate loss (Rupees in crores)
I. — Lines which can be closed down. In all these cases, the road services are adequate to meet the full transport requirement of the area.	40	1,485	4.96
II. — Lines which can be closed provided the 'Kachha' roads, which become unserviceable during monsoon, are converted into all-weather metalled roads.	17	935	2.01
III. — Lines for which surveys have been ordered for their conversion.	5	359	1.33
IV. — Remaining lines which cannot be closed for a variety of reasons, such as (i) Strategic importance. (ii) Serving remote areas not accessible by road or where adequate road transport is not available. (iii) Serving hill towns which are important from tourist point of view and which cover picturesque and enchanting valleys. (iv) Link coalfields, etc.	74	5,101	32.16
Total	136§	7,880	40.43

\* This does not include dividend as no dividend is paid.

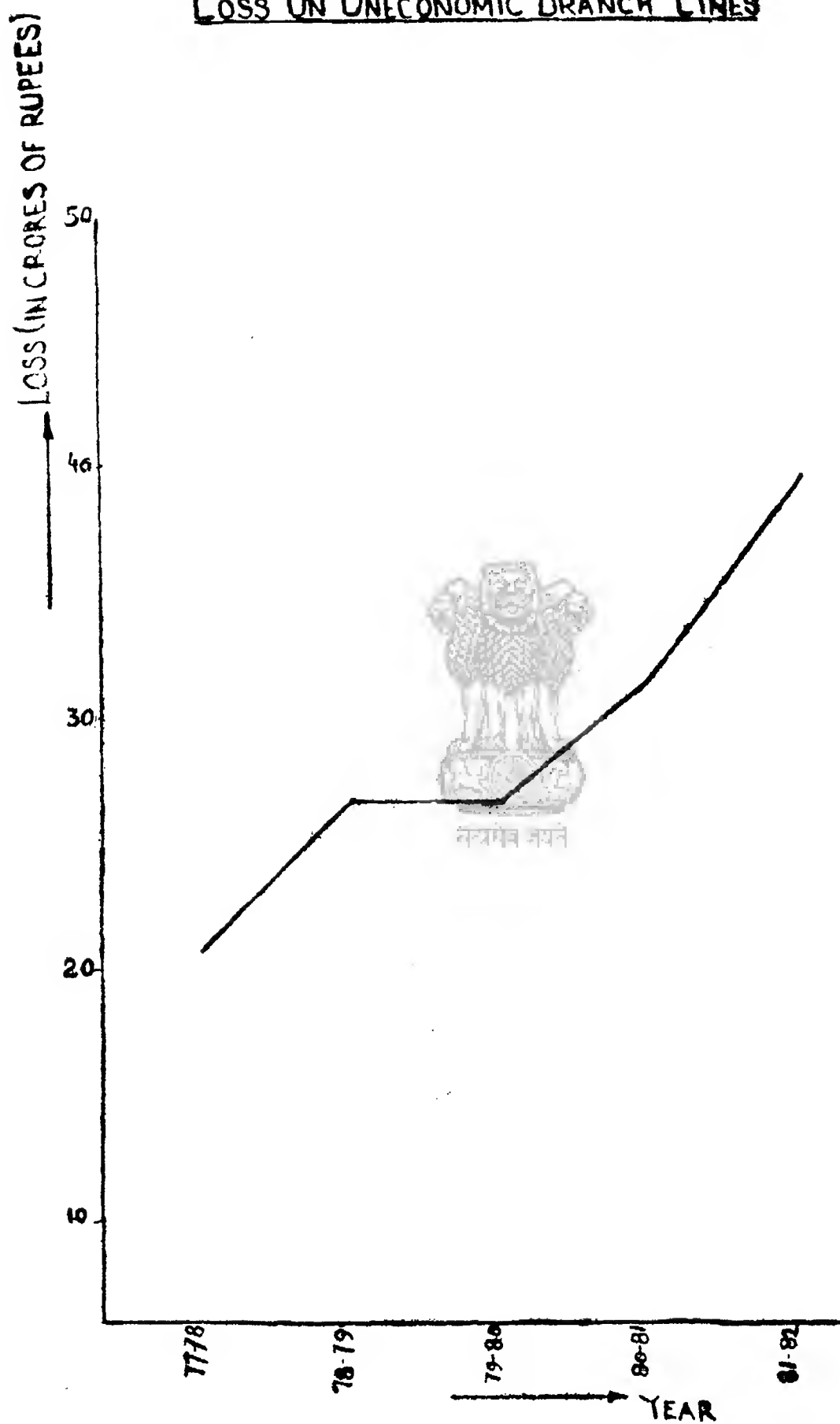
† (25 Broad Gauge 74 Metre Gauge and 36 Narrow Gauge).

@ Explanatory Memorandum on the Railway Budget, 1983-84, Appendix XX (Page 106).

§ Purulia-Kotshila-Ranchi-Lohardaga has been split into two lines, viz., Purulia-Kotshila (Category IV) and Ranchi-Lohardaga (Category III). This explains the difference between the figure of 135 shown in Table 2.1 and the figure of 136 shown above.



## LOSS ON UNECONOMIC BRANCH LINES





15.2. The category-wise particulars of these lines are given in Annexure A.2.2. Our detailed recommendations for each category are discussed hereinafter.

#### 16.0. Category I.

16.1. The existing road services are adequate to meet the transport requirements of the area served by these 40 lines and their closure should not result in any inconvenience to the community. Their retention does not also merit consideration from the point of view of strategic or tourist importance or from development angle.

16.2. We recommend that the Railways should immediately enter into serious dialogue with the State Governments for the closure of these lines and come to a definite conclusion either way.

16.3. With the facts and figures available, the State Governments should either agree to their closure or where they find it difficult to agree for local considerations, they should share the losses on 50-50 basis. This would ensure their interest in promoting traffic on these sections to make them increasingly viable.

16.4. While it is not incumbent upon the Railways to obtain consent of the State Governments for the closure of branch lines, we have suggested consultation with them for the purpose of goodwill and their cooperation in the area of rail-road transport coordination. The dialogues with the State Governments should not, however, be longdrawn and the closure of these lines where decided upon should be completed within one to two years so as not to continue with the extremely non-viable situation.

16.5. Every year, the State Governments are paid grants in lieu of the passenger fare tax\* as well as to meet their share of cost of road safety works.\*\* The annual amount of grant paid at present is Rs. 26.5 crores out of which an amount of Rs. 23.1 crores is in lieu of passenger fare tax and the remaining Rs. 3.4 crores for safety works. The distribution of the grant among the States is done according to the proportions fixed by the Finance Commissions appointed from time to time.

16.6. The losses incurred on the 40 branch lines, which have been found fit for closure, have been grouped State-wise and compared (Table 2.2.) with the grants payable in lieu of passenger fare tax.

Table 2.2  
Share of grant vis-a-vis loss on uneconomic branch lines

State	Share of the grant as fixed by the Seventh Finance Commission.	Loss on uneconomic branch lines (Rupees in lakhs)
Andhra Pradesh ...	162	25
Assam ...	57	...
Bihar ...	220	65
Gujarat ...	122	91
Haryana ...	46	2
Himachal Pradesh ...	3	...
Jammu Kashmir ...	17	...

\* Passenger Fare Tax Act, 1957, authorised levy of tax on passenger fares which was to be passed on to the State Governments. This Act was repealed in 1961 and since then grant in lieu of the tax is being paid to the State Governments.

State	State of the grant as fixed by the Seventh Finance Commission	Loss on uneconomic branch lines (Rupees in lakhs)
Karnataka ...	74	8
Kerala ...	60	22
Madhya Pradesh ...	135	19
Maharashtra ...	367	...
Manipur ...	...	...
Meghalaya ...	...	...
Nagaland ...	6	...
Orissa ...	40	37
Punjab ...	88	...
Rajasthan ...	127	44
Sikkim ...	...	...
Tamil Nadu ...	158	18
Tripura ...	1	...
Uttar Pradesh ...	429	145
West Bengal ...	200	20
Total ...	2,312	496

16.7. Table 2.2 shows that for each State, the aggregate loss on uneconomic branch lines is much less than the respective State's share of the grant payable to it in lieu of passenger fare tax.

16.8. We recommend that in respect of lines not closed (out of the 40 lines included in Category I), the Railways should set off 50 per cent of the losses against the shares of the grant payable to the States in lieu of passenger fare tax. This adjustment should commence after a period of two years, the maximum time limit set by us† for completion of the dialogues. We suggest that this recommendation should also be placed before the Finance Commission.

16.9. The Committee hope that with the implementation of this recommendation, the involvement of the State Governments would be more participatory, objective and purposeful. The State Governments, once they find that their share of the grant is getting reduced, would not adopt a rigid posture against proposals to close down such lines on the merits of each case. In any case they would make more serious efforts to improve the financial viability of the uneconomic branch lines so that the losses thereon are cut down and to that extent their share of the grant gets restored.

16.10. The Committee find that on the following lines included in category I the train services have since been discontinued :

Lines	Gauge	Length (in kilometres)	Loss †† (Rupees in lakhs)
1. Piplod-Deogadh Bariya	Metre Gauge	15	0.6
2. Than-Chotila	"	20	0.4
3. Hadmadtiya-Jodiya	"	38	0.4
4. Khambhalya-Salaya	"	13	...
5. Botad-Jasdan	"	54	7.1
6. Ningala-Gadhada Swaminarayan.	"	15	3.1
7. Morvi-Tankara	Narrow Gauge	20	0.2
Total		175	11.8

\*\* Such as construction of road over and under bridges in lieu of level crossings, etc.

† Cf. para 16.4 of this Chapter.

†† Incurred on maintenance and guarding these lines.



The sections Than-Chotila Hadmadtiya-Jodiya and Khambhaliya-Salaya have become isolated with the conversion of Viramgam-Okha section from metre gauge to broad gauge. The running of trains on these sections is not operationally feasible and has been discontinued by the Railways. As for the suspension of train services on the other four lines, we understand that the road transport has been able to meet the requirements of traffic. We recommend that these lines should be immediately dismantled.

16.11. As against the Railway Board's recommendations to close down 54 branch lines, we have suggested closure of 40 branch lines for the present. We are not in favour of closure of lines like New Mal-Changrabandha, Bharaigram-Dullabcherra, located in the State of Assam. We are also not in favour of closing down lines like Samadari-Munabao, Pokaran-Jaisalmar which are important from strategic point of view. A few lines cannot be closed in view of heavy religious congregations during certain times of the year. The particulars of lines included in the list of 54 lines sent to us by the Rly. Board, but not recommended by us for closure are given in Annexure A. 2.3 (Page 52). This Annexure also shows lines not recommended by the Board for closure but considered fit for closure by us.

#### 17.0. Category II.

17.1. We recommend that the 'katchha' roads in the areas served by these 17 lines should be converted by the State administration concerned into 'all weather' metalled roads and bus services augmented to facilitate discontinuance of the railway services.

17.2. The Railways and the State Governments should draw out a time table for such conversion to be completed within a period of five years.

17.3. Meanwhile the Railways should examine reducing the rail services on these lines ensuring, however, that on all these sections, at least one pair of trains is run till the road services fully take over.

17.4. In case any particular State Government is found unwilling in this respect the particular branch line concerned should be considered to be in Category I.

#### 18.0 Category III.

18.1. The action to be taken in respect of the five lines for which conversion surveys have been ordered, would depend upon the findings of the surveys.

18.2. The survey reports should be critically examined by the Railways and appropriate action taken in the back ground of the suggestions made by us for various categories.

18.3. It should, however, be kept in view, as elaborately discussed in Part II of our Report on Transportation,\* that conversion is no panacea for the ills of the section, it may eventually pose more problems than it would solve.

#### 19.0. Category IV.

19.1. Committee are of the view that the losses on the 74 uneconomic branch lines placed in this category should continue to be borne by the Railways.

19.2. Some of these lines like Anritsar-Atari and Samadari-Munabao are important from strategic point of view. Others like Kalka-Simla and New Jalpaiguri-Darjeeling serve important hill stations, covering picturesque and enchanting terrains and landscapes and are important for promotion of tourism. Satpura narrow gauge Railway, with route length of over 1,000 kilometres serving Central India can hardly be called a branch line.

19.3. All these lines should be considered not as separate entities, but as part of the railway system from the overall financial viability point of view.

#### 20.0. Techno-economic studies.

20.1. Out of the 136 uneconomic branch lines, there are 49 lines on each of which the annual operating loss exceeds Rs. 20 lakhs. These lines have been arranged, in order of loss, in Annexure A. 2.4 (Pages 53-54). Satpura Railway, with an annual loss of Rs. 8.6 crores is in the forefront followed by New Jalpaiguri-Darjeeling-Katihar-Jogbani etc.

20.2. Satpura Railway, though the most uneconomical branch line is serving the important economic needs of a vast region. This narrow gauge system cannot be closed down. Steps should, therefore, be taken to improve its viability. We find that, towards this end, the Uneconomic Branch Lines Committee, 1969, had recommended examination of the economics of this railway, section by section, by a Departmental Committee.

20.3. South Eastern Railway did appoint such a Committee comprising their Marketing and Sales Superintendent and Deputy Chief Operating Superintendent but the study was given up as a time consuming job. Other reasons given were :

1. The return on capital on Satpura Railway as a whole was progressively coming down.
2. A survey was conducted for conversion of northern portion of the Satpura Railway which revealed that the return on capital was likely to be only 0.5%.
3. Since the traffic offering on the southern component of the Satpura system was much less, the section-by-section study would not give significantly different indication.

20.4. We feel that the study would have been useful and should not have been linked with the survey conducted for conversion of this system to broad gauge.

20.5. We recommend that a techno-economic study of Satpura Railway should now be carried out urgently by experts drawn from Engineering, Commercial, Operating and Accounts disciplines. The study should clearly bring out the specific measures to be taken to reduce the deficit and that aggressive marketing policies could be adopted to attract more traffic.

20.6. The study team would also consider :-

1. Sections where trains can be cancelled or reduced.

\*Cf. Para 20, Chapter II



2. Stations which can be closed or converted into halts and what economics are possible in staff fuel and maintenance.
3. Sections where modernisation might help in cutting down expenses in the long run.
4. Specific sections or sub-sections which can and should be closed down in order to improve the viability of the rest of the network.

20.7. The Techno-economic study on Satpura Railway, we recommend should be conducted and completed by the South Eastern Railway within a period of six months and the specific decisions taken thereon by the General Manager, South Eastern Railway and the Railway Board within the next six months, so that the entire exercise including decision making, is completed within one year.

20.8. We further recommend that such techno-economic studies should also be carried out in respect of branch lines other than those included in Category I and on which the annual loss exceeds Rs. 20 lakhs.

20.9. Except for the Satpura Railway study which should be entrusted to a Techno-economic Survey Team specifically created for the purpose, these studies can be assigned to the existing survey teams on the Railways and should be completed according to a set timetable.

## 23.0. Construction sidings.

23.1. The Railways construct, sidings for carriage of material equipment, machinery and labour required for execution of big projects. Such sidings become redundant after the projects are completed. The rails etc. can then be uprooted without any difficulty and used elsewhere.

23.2. The Committee have come across one such siding constructed in Bihar for the Kosi Projects taken up by the River Valley Project Department of Bihar (at the cost of the Government of India). The project was completed in 1966-67 and the siding on the Indian side ceased to function shortly thereafter. This siding is of narrow gauge and is nearly 70 kilometres extending from Jogbani (metre gauge rail head) to Birpur and is lying redundant.

23.3. The Committee recommend that this siding should be dismantled and material used with advantage elsewhere. The Committee further recommend that a review should be carried out by the Railways and similar lines lying redundant but which are otherwise valuable in monetary terms should be lifted and released material put to use.

## 24.0. Conclusions.

24.1. The 40 uneconomic branch lines listed in Category I should be closed down. The road services in the area as served by these lines are adequate to meet





Annexure A. 2.1  
(cf. paragraph 14.7)List of 54 uneconomic branch lines identified  
for closure.

S. No.	Name of the branch line	Railway	Capital cost (Rupees in lakhs)	Loss (Rupees in lakhs) excluding dividend	S. No.	Name of the branch line	Railway	Capital cost (Rupees in lakhs)	Loss (Rupees in lakhs) excluding dividend
	<b>ANDHRA PRADESH</b>				25.	Phagwara-Jajjon Doaba (BG)	N	99.77	20.72
1.	Gudivada-Machilipatnam (BG)	S.C.	13.01	1.82		<b>RAJASTHAN</b>			
2.	Naupada-Gunupur (NG)	S.E.	7.37	25.30	26.	Dholpur-Tantpur-Siramuttra (NG).	C	9.00	19.49
	<b>ASSAM</b>				27.	Pipar Road Bijara (MG)	N	15.26	15.31
3.	New Mal Changrabandha (MG).	N.F.	25.96	18.14	28.	Makrana-Parbatsar (MG)	N	7.83	1.08
4.	Baraigram-Dullabcherra (MG)	N.F.	16.75	18.10	29.	Samdari-Munabao (MG)	N	41.11	121.74
	<b>BIHAR</b>				30.	Balotra-Panchpadra (MG)	N	9.42	16.56
5.	Barasat-Hasanabad (BG)	E.	264.12	31.52	31.	Tilwara-Tilwara Fair (MG)	N	0.83	0.40
6.	Bahktiyarpur-Raigir (BG)	E.	271.94	6.98	32.	Raj-Ka-Bagh Pokaran (MG)	N	50.87	72.18
7.	Sahabpur Kamal-Monghyr Ghat (MG).	N.E.	14.49	9.75	33.	Pokaran Jaisalmer (MG)	N	249.53	67.42
8.	Katihar-Manihari Ghat (MG)	N.F.	18.74	97.91	34.	Ratangarh-Sardarshahr (MG)	N	70.50	2.52
	<b>GUJARAT</b>				35.	Mavli-Bari Sadri (MG)	W	39.91	7.87
9.	Pipod-Devgadh Balia (NG)	W	7.60	0.61	36.	Sanganer Town-Toda Rai Singh (MG).	W	132.60	23.22
10.	Gandhidham-New Kandla (MG).	W	14.75	20.27		<b>TAMILNADU</b>			
11.	Hadmatiya-Jodiyi (MG)	W	21.08	0.37	37.	Tiruturaipundi-Kodikkarai (MG).	S	40.17	7.49
12.	Khambhaliya-Salaya (MG)	W	7.18	(+) 0.26	38.	Nidamangalam-Manna gudi (MG).	S	5.74	2.72
13.	Kunkavav-Derdi (MG)	W	6.80	..	39.	Mayuram-Tarangambadi Tranquebar (MG).	S	14.98	8.42
14.	Kunkavav-Bagasra (MG)	W	11.58	5.34		<b>UTTAR PRADESH</b>			
15.	Botad-Jasdan (MG)	W	31.01	7.09	40.	Ait-Konch (BG)	C	5.17	5.63
16.	Ningala-Gadhada-Swaninayan (MG).	W	8.81	3.14	41.	Barhan-Etah (BG)	N	127.85	58.93
17.	Shapur-Saradiya (MG)	W	24.37	3.90	42.	Raja-ka-Sahaspur-Sambal-Hati Sarai (BG).	N	52.42	5.77
18.	Bhavnagar-Mahuva (NG)	W	55.13	47.67	43.	Mankapur-Katra (MG) .Al-ready closed).	N.E.	5.03	38.75
	<b>HARYANA</b>				44.	Indra-Dohli Ghat (MG)	N.E.	8.63	36.07
19.	Garhi Harsaru-Farrukhnagar (MG).	N.	6.48	1.77	45.	Madhosingh Chilh (MG)	N.E.	4.82	10.33
	<b>KARNATAKA</b>				46.	Dudwa-Chandan Chauki (MG)	N.E.	2.66	9.94
20.	Nanjangud-Chamarajanagar (MG).	S	12.70	13.49	47.	Dudwa-Gauri Phanta (MG)	N.E.	10.41	12.54
21.	Sagara-Talguppa (MG)	S	6.39	8.20	48.	Sahabaznagar-Keruganj (MG)	N.E.	0.67	6.50
	<b>KERALA</b>				49.	Mandhana-Brahmavart (MG)	N.E.	4.21	7.05
22.	Shoranur-Nilamber Road (BG)	S	109.80	21.99	50.	Mathura Road-Vrindaban (MG)	N.E.	6.58	8.27
	<b>PUNJAB</b>					<b>WEST BENGAL</b>			
23.	Batala-Qadian (BG)	N	8.47	20.59	51.	Shantipur-Nabadwip Ghat (NG).	E	11.96	9.13
24.	Verka-Darababa Nana (BG)	N	77.07	32.56	52.	Burdwan-Katwa (NG)	E	26.17	20.03
					53.	Lataguri-Ramshai (MG)	N.F.	2.84	3.09
					54.	Purulia-Kotshila (NG)	S.E.	86.03	12.67
						<b>Total</b>		<b>2,245.69</b>	<b>988.27</b>

† Means that the earnings exceeded the operating expenses but the line still remained uneconomic as it did not yield the prescribed rate of return.



**CATEGORY I.—LINES WHICH CAN BE CLOSED DOWN IN ALL THESE CASES, THE ROAD SERVICES ARE ADEQUATE TO MEET THE FULL TRANSPORT REQUIREMENTS OF THE AREA.**

S. No.	Name of uneconomic branch line	State	Gauge	Length in kms.)	Capital cost (Amount in crores of Rupees)	Loss excluding dividend
<b>CENTRAL RAILWAY</b>						
1.	Ait-Konch	U.P.	BG	14	0.05	0.06
2.	Dholpur-Tantpur-Siramuttra	M.P.	NG	89	0.09	0.19
<b>EASTERN RAILWAY</b>						
3.	Burdwan-Katwa	West Bengal	NG	53	0.26	0.20
4.	Bakhtiyarpur-Rajgir	Bihar	BG	53	2.72	0.07
<b>NORTHERN RAILWAY</b>						
5.	Garhi-Harsaru-Farukhanagar	Haryana	MG	12	0.06	0.02
6.	Pipar Road-Bilara	Rajasthan	MG	42	0.15	0.15
7.	Maharana-Parabatsar	Rajasthan	MG	22	0.08	0.01
8.	Balotra-Pachpadra	Rajasthan	MG	24	0.09	0.17
9.	Tilwara-Tilwara Mela	Rajasthan	MG	3	0.01	0.04
10.	Ratangarh-Sardarshahr	Rajasthan	MG	48	0.71	0.03
11.	Barhan-Etah	U.P.	BG	59	1.28	0.59
12.	Raja-ka-Sahaspur-Sambhal Hatim Sarai	U.P.	BG	24	0.52	0.06
<b>NORTH EASTERN RAILWAY</b>						
13.	Indara-Dohrighat	U.P.	NG	35	0.09	0.36
14.	Sahibpur-Kamal-Monghyar Ghat	Bihar	MG	14	0.14	0.10
15.	Dudwa-Gauri Phanta	U.P.	MG	24	0.10	0.13
16.	Shahbaznagar-Keruganj	U.P.	MG	9	0.01	0.07
17.	Mandhana-Brahmavari	U.P.	MG	8	0.04	0.08
18.	Dudwa-Chandanj chowki	U.P.	MG	13	2.66	0.10
<b>NORTH EAST FRONTIER RAILWAY</b>						
19.	Katihar-Manihari Ghat	Bihar	MG	45	0.19	0.48
<b>SOUTHERN RAILWAY</b>						
20.	Shoranur-Nilambar Road	Kerala	BG	66	1.10	0.22
21.	Nidamangalam-Mannargudi	Tamil Nadu	MG	13	0.06	0.03
22.	Peralam-Karaikal	Tamil Nadu/Pondicherry	MG	24	0.11	0.07
23.	Mayuram-Tarangambadi (Tranquebar)	Tamil Nadu	MG	30	0.15	0.08
24.	Sagara-Talguppa	Karnataka	MG	16	0.06	0.08
<b>SOUTH EASTERN RAILWAY</b>						
25.	Naupada-Gunupur	A.P.	NG	09	0.07	0.25
26.	Rupsa-Talband	Orissa	NG	89	0.25	0.37
<b>WESTERN RAILWAY</b>						
27.	Bilimora-Waghai	Gujarat	NG	63	0.32	0.17
28.	Piplod, Devgadh Bariya	Gujarat	NG	15	0.08	0.01
29.	Mali-Bari Sadri	Punjab	MG	82	0.40	0.08
30.	Than-Chojila	Gujarat	MG	20	0.12	0.004
31.	Bhavnagar-Mahuva	Gujarat	NG	108	0.55	0.48
32.	Hadmatiya-Jodiya	Gujarat	MG	38	0.22	0.004
33.	Khambhaliva Salava	Gujarat	MG	13	0.07	0.003
34.	Chanasma Harij	Gujarat	MG	21	0.12	0.01
35.	Himmatnagar-Khad Brahma	Gujarat	MG	55	0.15	0.001
36.	Kunkavav-Bagasara	Gujarat	MG	20	0.12	0.04
37.	Botad-Jasdan	Gujarat	MG	54	0.31	0.07
38.	Ningaia-Gadhada Swaminarayan	Gujarat	MG	15	0.09	0.03
39.	Shapur Saradiya	Gujarat	MG	42	0.24	0.09
40.	Morvi-Tankara	Gujarat	NG	20	0.10	0.002

† Cf. footnote on Annexure A-2.1



**CATEGORY II—LINES WHICH CAN BE CLOSED PROVIDED THE 'KATCHHA' ROADS WHICH BECOME UNSERVICEABLE DURING MONSOON, ARE CONVERTED INTO ALL-WEATHER METALLED ROADS.**

S. No.	Name of the uneconomic branch line	State	Gauge	Length (in kms.)	Capital cost	Loss excluding dividend (Amount in crores of Rupees)
<b>WESTERN RAILWAY</b>						
1.	Kosamba-Umarpada	Gujarat	NG	62	0.19	0.14
2.	Godhra-Lunavada	Gujarat	NG	40	0.21	0.06
3.	Champaner Road-Shivrajpur Pani Mines	Gujarat	NG	49	0.25	0.12
4.	Dabhoi-Timba Road	Gujarat	NG	100	0.51	0.28
5.	Bharuch-Jambusar-Kavi	Gujarat	NG	76	0.39	0.23
6.	Angleshwar-Rajpipla	Gujarat	NG	63	0.32	0.19
7.	Chota Udepur-Jambusar	Gujarat	NG	150	0.77	0.03
8.	Nadiad-Kapadvanj	Gujarat	NG	45	0.23	0.20
9.	Nadiad-Bhadran	Gujarat	NG	58	0.29	0.22
10.	Choranda-Motikoral	Gujarat	NG	19	0.10	0.06
11.	Chandod-Malsar	Gujarat	NG	87	0.44	0.04
12.	Jagadiya-Netrang	Gujarat	NG	30	0.15	0.07
13.	Chhuchhapura-Tankhala	Gujarat	NG	38	0.19	0.12
14.	Samni-Dahej	Gujarat	NG	39	0.20	0.11
15.	Boriyavi-Vadtal Swaminarayan	Gujarat	NG	7	0.07	0.05
16.	Morbi-Ghantila	Gujarat	NG	45	0.23	0.04
17.	Jorawarnagar-Sayla	Gujarat	NG	27	0.14	0.05

Annexure A.2.2.

**CATEGORY III—LINES FOR WHICH SURVEYS HAVE BEEN ORDERED FOR THEIR CONVERSION.**

S. No.	Name of uneconomic branch line	State	Gauge	Length (in kms.)	Capital cost	Loss excluding dividend (Amount in crores of Rupees)
<b>CENTRAL RAILWAY</b>						
1.	Gwalior-Bhind	M.P.	NG	84	N.A.	0.35
<b>NORTH EASTERN RAILWAY</b>						
2.	Kashipur-Ramnagar	U.P.	MG	27	0.12	0.35
<b>SOUTHERN RAILWAY</b>						
3.	Madurai-Bodinayakkanur	Tamil Nadu	MG	90	0.82	0.31
<b>SOUTH EASTERN RAILWAY</b>						
4.	Ranchi-Lohardaga	Bihar	NG	69	*	*
5.	Raipur-Dhamtari	M.P.	NG	89	0.18	0.31

N.A. stands for Not available.

\* Included in the line—Purulia-Kothila (S. No. 68)



**CATEGORY IV—REMAINING LINES WHICH CANNOT BE CLOSED FOR A VARIETY OF REASONS FOR THE PRESENT.**

<i>S. No.</i>	<i>Name of uneconomic branch line</i>	<i>State</i>	<i>Gauge</i>	<i>Length (in kms.)</i>	<i>Capital cost</i>	<i>Loss excluding dividend (Amount in crores of Rupees)</i>
<b>CENTRAL RAILWAY</b>						
1.	Panvel-Apta	Maharashtra	BG	16	0.83	40.06
2.	Miraj-Kurduvadi-Latur	Maharashtra	NG	327	1.79	0.76
3.	Gwalior-Sheopur Kalan	M.P.	NG	280	0.66	1.28
4.	Pachora-Jamner	Maharashtra	NG	56	0.18	0.10
<b>EASTERN RAILWAY</b>						
5.	Barasat-Hasanabad	West Bengal	BG	53	2.64	0.32
6.	Ikra-Ghorandi	West Bengal	BG	21	0.16	0.04
7.	Bhingara-Palasthali	West Bengal	BG	27	0.26	0.06
8.	Dildarnagar-Tarighat	U.P.	BG	19	0.13	0.02
9.	Tinpahar-Rajmahal	Bihar	YG	12	0.08	0.01
10.	Shantipur-Nabadwip Ghat	West Bengal	NG	28	0.12	0.09
<b>NORTHERN RAILWAY</b>						
11.	Batala-Quadian	Punjab	BG	20	0.08	0.21
12.	Verka-Derababa Nanak	Punjab	BG	46	0.77	0.33
13.	Phagwara-Jaigon Doaba	Punjab	BG	62	1.00	0.21
14.	Amritsar-Atari	Punjab	BG	26	0.28	0.12
15.	Rohtak-Gohana	Haryana	BG	32	0.31	0.07
16.	Rai Ka Bagh Palace-Pokaran	Rajasthan	MG	192	0.51	0.72
17.	Pokaran-Jaisalmer	Rajasthan	MG	106	2.50	0.67
18.	Samdari-Munabao	Rajasthan	MG	248	0.41	1.22
19.	Pathankot-Joginder Nagar	Himachal Pradesh	NG	164	2.31	0.86
20.	Kalka-Shimla	Himachal Pradesh	NG	96	2.78	0.72
<b>NORTH EASTERN RAILWAY</b>						
21.	Narkatiaganj-Bagaha	Bihar	MG	42	0.08	0.49
22.	Kaptanganj-Chitauni	U.P.	MG	49	0.14	0.36
23.	Narkatiaganj-Bhikhna Thori	Bihar	MG	36	0.07	0.42
24.	Anandnagar-Nautanwa	U.P.	MG	41	0.35	0.35
25.	Sakri-Jaynagar	Bihar	MG	49	0.33	0.51
26.	Banmankhi-Bihariganj	Bihar	MG	28	0.23	0.31
27.	Salampur-Barhaj Bazar	U.P.	MG	20	0.07	0.29
28.	Gainsari-Jarwa	U.P.	MG	15	0.11	0.18
29.	Manakpur-Katra	U.P.	MG	30	0.05	0.39
30.	Mathura-Vrindavan	U.P.	MG	13	0.88	0.08
31.	Madhosingh-Chilh	U.P.	MG	12	0.05	0.10
<b>NORTH EAST FRONTIER RAILWAY</b>						
32.	Singhabad-Old Malda	West Bengal	BG	25	0.94	0.40
33.	Katihar-Kumedpur	Bihar & WB	BG	37	1.17	0.48
34.	Alipur Duar-New Gitaldaha Bamnhat	West Bengal	MG	75	0.31	0.81
35.	rsoi-Radbikapur	Bihar & WB	MG	53	0.22	0.81
36.	Ledo-Lekhapani	Assam	MG	29	0.12	0.05



S.No.	Name of uneconomic branch line	State	Gauge	Length (in Kms.)	Capital cost	Loss excluding dividend (Amount in crores of Rupees)
37.	Simaluguri-Naginimora	Assam	MG	15	0.07	0.10
38.	Mariani-Jorhat (Neamati)	Assam	MG	16	0.26	0.16
39.	Karimganj-Maishashan	Assam	MG	11	0.07	0.13
40.	Raja Bhat Khawa-Jainti	West Bengal	MG	16	0.23	0.15
41.	Katihar-Jogbani	Bihar	MG	111	0.45	1.35
42.	Fakiragram-Dhubri	Assam	MG	67	0.27	0.72
43.	Makum-Dangari	Assam	MG	31	0.26	0.25
44.	Simaluguri-Moranhat	Assam	MG	54	0.29	0.36
<b>NORTH FRONTIER RAILWAY</b>						
45.	Tezpur-Rangapara North	Assam	MG	26	0.11	0.61
46.	Lataguri-Ramshai	West Bengal	MG	9	0.03	0.03
47.	New Mal-Changrabandha	Assam	MG	62	0.26	0.18
48.	Baraigram-Dullacherra	Assam	MG	52	0.17	2.16
49.	New Jalpaiguri-Darjeeling	West Bengal	NG	88	0.88	+0.01
<b>SOUTHERN RAILWAY</b>						
50.	Villuparam-Pondicherry	Kerala	MG	38	0.19	0.15 0.13
51.	Chikjajur-Chitradurg	Karnataka	MG	34	0.13	0.25
52.	Nanjangud-Chamara jnagar	Karnataka	MG	35	0.13	0.72
53.	Tirunelveli-Tiruchendur	Tamil Nadu	MG	62	0.40	0.07
54.	Mettupalaiyam-Ootacamund (Udagamandalam)	Tamil Nadu	MG	46	0.50	0.20
55.	Tiruturaipundi-Kodikkarai	Tamil Nadu	MG	46	0.13	0.02
56.	YelahanSa-Banakrapet	Karnataka	NG	150	0.90	0.07
<b>SOUTH CENTRAL RAILWAY</b>						
57.	Gudivada-Machilipatnam	A.P.	BG	37	0.13	0.20 0.02
58.	Mudkhed-Adilabad	A.P./Maharashtra	MG	162	0.90	0.11
59.	Jankampet-Bodhan	A.P.	MG	20	0.08	+0.001
60.	Hospet-Kotturu	Karnataka	MG	70	0.16	0.02
61.	Bellary-Rayadurg	Karnataka	MG	54	0.08	0.11
<b>SOUTH EASTERN RAILWAY</b>						
62.	Bobbili-Salur	A.P.	BG	18	0.72	0.09
63.	Kanhan-Ramtek	Maharashtra	BG	24	0.31	0.01
64.	Tata-Badampahar	Bihar	BG	99	8.58	0.34
65.	Nawagaon-Bondamunda	Bihar	BG	29	2.12	+0.05
66.	Khurda Road-Puri	Orissa	BG	44	3.19	0.22
67.	Satpura Railway	Maharashtra	NG	1,007	4.37	8.64
68.	Purulia-Kotshila	West Bengal	NG	35	0.86	0.13*
<b>WESTERN RAILWAY</b>						
69.	Prachi Road-Kodinar	Gujarat	MG	26	0.15	0.03
70.	Talala-Delvada	Gujarat	MG	71	0.41	0.19
71.	Sihor-Palitana	Gujarat	MG	27	0.16	0.08
72.	Dungar-Victor	Gujarat	MG	7	0.07	0.04
73.	Gandhidham-New Kandla	Gujarat	MG	12	0.75	0.29
74.	Sanganer Town-Toda Rai Singh	Rajasthan	MG	105	1.33	0.23

\* This also includes the loss of Ranchi-Lohardaga.



<i>Lines in Category I (40 lines) but not in Railway Board's list of 54 uneconomic branch lines</i>		<i>Lines in Railway Board's list of 54 uneconomic branch lines but not in our Category I (40 lines)</i>	
1. Peralam-Karalkkal	— MG	1. Barasat-Hasanabad	— BG
2. Bilimora-Waghai	— NG	2. Verka-Derababa Nanak	— BG
3. Chanasma-Harij	— MG	3. Batala-Quadlan	— BG
4. Himmatnagar-Khedbrahma	— MG	4. Phagwara-Jaijon Doaba	— BG
5. Morvi Tankara	— NG	5. Samdari-Munabao	— MG
		6. Rai Ka Bagh-Pokaran	— MG
		7. Pokaran-Jaisalmer	— MG
		8. Lataguri-Ramshai	— MG
		9. New Mal-Changrabandha	— MG
		10. Baraigram-Dullabcheria	— MG
		11. Najnangud-Chamarajnagar	— MG
		12. Tiruturaipundi-Kodikkarai	— MG
		13. Gudivada-Machilipatnam	— BG
		14. Purulia-Kotshila	— NG
		15. Gandhidham-New Kandla	— MG
		16. Manakpur-Katra	— MG
		17. Mathura-Vrindavan	— MG
		18. Madhosingh-Chilh	— MG
		19. Shantipur-Nabadwip Ghat	— NG

## LINES OVER WHICH ANNUAL LOSS EXCEEDS RUPEES 20 LAKHS

<i>S. No.</i>	<i>Name of the uneconomic branch lines</i>	<i>State</i>	<i>Gauge</i>	<i>Railway</i>	<i>Loss excluding dividend (Rupees in lakhs)</i>
1.	Satpura Railway	Maharashtra	NG	S.E.	864
2.	New Jalpaiguri-Darjeeling	West Bengal	NG	N.F.	216
3.	Katihar-Jogbani	Bihar	MG	N.F.	136
4.	Gwalior-Sheopur Kalan	M.P.	NG	C.	128
5.	Samdari-Munabao	Rajasthan	MG	N.	122
6.	Pathankot-Joginder Nagar	H.P.	NG	N.	86
7.	Alipur Duar-New Gitaldaha Bamanhat	West Bengal	MG	N.F.	81
8.	Barsoi-Radhikapur	Bihar & W.B.	MG	N.F.	81
9.	Miraj-Kurduvadi-Latur	Maharashtra	NG	C	76
10.	Rai Ka Bagh Palace-Pokaran	Rajasthan	MG	N.	72
11.	Kalka-Simla	H.P.	NG	N.	72
12.	Fakiragram-Dhubri	Assam	MG	N.F.	72
13.	Mettupalaiyam-Otacamund (Udagamandalam)	Tamil Nadu	MG	S.	72
14.	Pokaran-Jaisalmer	Rajasthan	MG	N.	67
15.	Tezporo-Rangapara North	Assam	MG	N.F.	61
16.	Barhan-Etah	U.P.	BG	N.	59



S. No.	Name of the uneconomic branch lines	State	Gauge	Railway	Loss excluding dividend (Rupees in lakhs)
17.	Sakri-Jaynagar	Bihar	MG	N.E.	51
18.	Narkatiaganj-Bagaha	Bihar	MG	N.E.	49
19.	Katihar-Kumedpur	Bihar	BG	N.F.	48
20.	Katihar-Manihari Ghat	Bihar	MG	N.F.	48
21.	Bhavnagar-Mahuva	Gujarat	NG	W.	48
22.	Narkatiaganj-Bhikhna Thori	Bihar	MG	N.E.	42
23.	Singhabad-Old Malda	West Bengal	BG	N.F.	40
24.	Manakapur-Katra	U.P.	MG	N.E.	39
25.	Rupsa-Talband	Orissa	NG	S.E.	37
26.	Kaptanganj-Chitauni	U.P.	MG	N.E.	36
27.	Indara-Dohrighat	U.P.	MG	N.E.	36
28.	Simaluguri-Moranhat	Assam	MG	N.F.	36
29.	Gwalior-Bhind	M.P.	NG	C.	35
30.	Anandnagar-Nautanwa	U.P.	MG	N.E.	35
31.	Tata-Badampahar	Bihar	BG	S.E.	34
32.	Kashipur-Ramnagar	U.P.	MG	N.E.	33
33.	Verka-Derabaha Napak	Punjab	BG	N.	33
34.	Barasat-Hasanabad	West Bengal	BG	E.	32
35.	Madurai-Bodinayakkanur	Tamil Nadu	MG	S.	31
36.	Raipur-Dhamtari	M.P.	NG	S.E.	31
37.	Banmankhi-Bihariganj	Bihar	MG	N.E.	31
38.	Salempur-Barhaj Bazar	U.P.	MG	N.E.	29
39.	Gandhidham,-New Kandla	Gujarat	MG	W.	29
40.	Dabhoi-Timba Road	Gujarat	NG	W.	28
41.	Makum-Dangari	Assam	MG	N.F.	26
42.	Tirunelveli-Tiruchendur	Tamil Nadu	M.G	S.	26
43.	Naupada-Gunupur	A.P.	NG	S.E.	25
44.	Bharuch-Jambusar-Kavi	Gujarat	NG	W.	23
45.	Khurda Road-Puri	Orissa	BG	S.E.	22
46.	Shoranur-Nilambar Road	Kerala	BG	S.	22
47.	Nadiad-Bhadran	Gujarat	NG	W.	22
48.	Batala-Quadian	Punjab	BG	N.	21
49.	Phagwara-Jaijon Doaba	Punjab	BG	N.	21



## CHAPTER III

### ECONOMY ON STEAM TRACTION

#### 1.0. Introduction.

1.1. One of the most potent threats required to be faced during the coming years is the deepening energy crisis. The current sources of conventional fuel are fast depleting and extensive exploration activities are on for discovering newer sources of oil as well as other sources of energy.

1.2. Intensive research work includes discovering substitute forms for extraction of oil.\* Such researches have not so far led to discovery of any economic substitutes.

1.3. Our known reserves of coal and oil per capita are poor as compared to those in the more advanced countries with large populations. The Sixth Five Year Plan document mentioned. + "While India has reserves of 176 tonnes of coal per person, USA has 13,488 tonnes, USSR 22,066 tonnes and China 1,168 tonnes. The balance of our proven reserves of oil are also very limited being only 0.55 tonnes per capita as against 34.83 tonnes in USSR, 16.32 tonnes in USA and 2.86 tonnes in China. As exploration proceeds, more reserves may no doubt be found, but the overall picture is unlikely to show any marked change."

1.4. The Working Group on Energy Policy appointed by the Planning Commission estimated that if no deliberate measures were initiated to control the consumption of fuel, the energy requirement to sustain and economic growth rate between 5.5 to 6 percent in the next 20 years would be around four times the present level of requirement. Even if measures were taken to increase the efficiency of fuel utilisation, the Group estimated that the energy demand by the turn of the century would be nearly three times of what it is at present.

1.5. To sustain such a rate of economic growth, India will have to evolve a coherent and coordinated energy strategy. The economic and efficient utilisation of energy is, therefore, integral to our growth-strategy. The top management in every sector of the economy will have to display a far greater degree of personal involvement in this regard and instil new values in the entire work force.

1.6. The development of transport sector, the largest consumer of petroleum products, has been somewhat lop-sided with the less efficient road transport steadily increasing its share of petroleum consumption than the more economical railway system. Within the railway system again, electrification which is the cheaper means of transport has not as yet been spread out even on the arterial routes.\*\*

1.7. The energy squeeze has made the Railways the lynch-pin transport-infrastructure to our developing economy. The very large rise in traffic anticipated by the turn of the century poses a big challenge. In

Part II of our Report on Transportation, we have detailed certain measures to meet this challenge. We have recommended that our freight traffic should overwhelmingly move in block loads, that the movement of 'smalls' traffic be rationalised by converting it into wagon-loads and indeed rake-loads as far as possible. We have recommended the gradual phasing out of 4-wheeled wagons. On the passenger side, we have asked the Railways to concentrate largely on the long and medium distance, inter-city and commuter traffic.

1.8. We have also recommended reduction in speed differential between freight and passenger trains. Further, we have placed emphasis on acceleration of the programme for electrification. And finally, a programme for rapid phasing out of steam locos, mainly on account of their higher working expenses and energy wastefulness, has been prescribed and for this purpose we have ourselves drawn up a programme. The above strategy is the key to overcome the twin challenge of increasing demand and the energy squeeze.

1.9. Haphazard and unplanned train operations, poor maintenance of locomotives, antiquated driving practices, unsatisfactory organisational set-up, leakages, thefts and pilferages are some of the important factors responsible for the excessive consumption of fuel on the Indian Railways. Some expert bodies have gone into these aspects in the past and have suggested adoption of certain measures. There has, however, not been any perceptible improvement in this regard and we cannot but remark that this is primarily due to fuel economy not being given the rightful place in the list of management priorities. This is an area which needs serious attention at the highest level not only to bring down working expenses, but more vitally as a measure to serve a national cause.

1.10. The fuel bill of Indian Railways today constitutes about 25 percent of their working expenses. The position for the last five years is given in Table 3.1.

Table 3.1  
Operating Expenses (fuel)  
(Rupees in crores)

Year	Steam	Diesel	Electric	Total	Percentage to ordinary working expenses
1977-78	142.67	122.77	51.31	316.75	20.16
1978-79	137.01	128.53	55.80	321.34	19.21
1979-80	171.49	150.95	68.05	390.49	20.78
1980-81	195.94	234.56	79.32	509.82	22.84
1981-82	224.93	349.20	116.25	690.37	25.26

Source.—Demands for Grants for respective years (Grant No.10).

\* Such as heavy oils, shale oil and tar sands and by synthesising liquid hydro carbon fuel from coal of which there is a large quantity in earth's crust.

+ Para 15.10

\*\* The arterial route, connecting the four metropolitan routes both laterally and diagonally, as also a few other highly intensive trunk routes cover only one fourth of the total track kilometrage, but carry three-fourth of total freight and more than half of total passenger transport,

† Though the quantity of coal consumed has gone down from 12.8 million tonnes in 1977-78 to 10.4 million tonnes in 1981-82, in monetary terms, the value of coal consumed has gone up during this period from Rs. 142.67 crores to Rs. 224.93 crores. This is due to sharp increase in the cost of coal. For example cost of coal per tonne for Grade 1 (Grade B from July, 1979), including freight and taxes was Rs. 107.68 as on 1 July, 1978, Rs. 214.23 as on 14 February, 1981, and Rs. 231.19 as on 27 May, 1982.



1.11. Considering that 25 percent of the working expenditure on the Railways is on fuel, we feel this is a potential area for organising sizeable economies. We have devoted separate Chapters for the three forms of fuel, namely, coal, diesel and electricity. The present Chapter deals with the economy on steam traction.

## 2.0 Phasing out of steam locomotives.

2.1. The steam traction has outlived its role and has to be quickly phased out. The phasing out plan suggested\* by us in an earlier Report is reproduced in Table 3.2.

Table 3.2

Perspective of steam locomotive holdings as recommended by us.

	Broad Gauge	Metre Gauge	Narrow Gauge
Holding on 31 March, 1982	3,975	2,423	340
Anticipated in 1989-90	1,000	450	190
Anticipated in 1994-95	55	143	Nil
	Steam totally eliminated in 1995-96	Steam totally eliminated in 1996	

2.2. Though steam traction is on its way out, steam locomotives would continue to remain on our system upto 1996, and considering that the coal bill of the Railways is presently over Rs. 200 crores, we feel it is necessary that possibility of economy in this field should also be explored.

## 3.0 Consumption of Coal : factors affecting.

3.1. The annual consumption of coal on the Indian Railways is about 10 million tonnes. Roughly 9 percent of the supplies are in Grade 'A', 56 percent in Grade 'B', 13 percent in Grade 'C' and the balance in lower grades. The consumption of coal depends upon the heat-value of the coal supplied, the utilisation of locomotives engine-hours in steam, trailing load, thermal efficiency of the locomotive, the quality of locomotive maintenance and the skill or running and maintenance staff. Besides, the Railways have also to pay for the coal pilfered from wagons in transit from pitheads to sheds, from shed premises themselves and also from the tenders of locomotives on line.

3.2. The number of factors is so large and the effect of each one of them on the consumption of coal is so variable that it is very difficult to relate the higher consumption rate to any one or more individual factors.

3.3. We have analysed the data available and have arrived at some irresistible conclusions pinpointing the areas where fuel economy is possible. These are discussed in paragraphs hereinafter.

## 4.0 Sample check : visual.

4.1. A fuel checking organisation working under the Chief Mining Adviser, Dhanbad, conducts visual checks at the time coal is loaded and also takes samples for grade checks to ensure that the coal supplied by the collieries is of proper specifications. These checks are

supplemented by similar checks conducted by the Fuel Control Organisation on each zonal railway.

4.2. Visual check is conducted with a view to assess the magnitude of undersized coal and shale present in the supplies made by the collieries. This check normally covers about 70 percent of the supplies made. The results of this check for the last five years are given in Table 3.3 below.

Table 3.3

Visual checks

year	Number of wagons loaded	Number of wagons visually inspected	Wagons -ound sub standard	
			Number	Percentage of supplies
1978-79	5,09,501	3,50,326	18,419	3.6
1979-80	4,92,966	3,47,405	22,199	4.5
1980-81	4,83,384	3,23,187	15,857	3.3
1981-82	4,45,046	3,27,553	35,520	8.0
1982-83	4,57,277	3,28,102	35,718	7.8

Source.—Obtained from Railway Board.

4.3. If the wagon contents are found to exceed the limits of tolerance specified for presence of slack and shale, penalties are levied as stipulated in the Agreement with Coal India Limited. Penalties are also imposed for wagons which, on visual inspection, are found to contain sub-grade coal. The penalties† imposed during the period 1978-79 onwards are given in Table 3.4 below.

Table 3.4

Penalties imposed : visul checks

Year	Number of wagons containing			Penalty imposed (Rupees in lakhs)
	Excess slack	Excess shale	Sub-grade coal	
1978-79	7,400	9,242	1,139	21.5
1979-80	7,504	9,265	5,131	36.9
1980-81	7,946	6,151	3,046	31.7
1981-82	17,989	11,833	1,632	84.7
1982-83	16,062	12,311	2,208	103.1

4.4. The Study Group‡ on Economy in Energy Consumption (1930) carried out random checks during their visits to various sheds and found that the substandard element was as much as 12 percent of the supplies made, as against 5 percent detected by the Chief Mining Adviser's staff for the year 1978-79. The Group recommended that the standard of detection of wagons with excess dust/slack does not appear to be good enough and that there was need for a stricter check in this respect. The position did not, however, improve; in fact it appears to have deteriorated in 1980-81 when the number of wagons found sub-standard were only 3.3 percent whereas it is known that the quality of supplies had not improved.

4.5. The Inspection Organisation under the Chief Mining Adviser should be energized. Frequent test

\* Para 4.0 of Chapter VII in Part II of our Report on Transportation.

† The number of wagons for which penalties are imposed during the year do not tally with the number of wagons found sub-standard as there is some overlap from the previous year.

‡ The Government of India appointed in May 1979 a Commission to conduct a comprehensive enquiry into government expenditure. Commission in turn set up a Study Group to make an in-depth study of energy consumption on the Indian Railways with a view to explore the possibility of effecting economies. This Group submitted its Report in April 1980.



checks should be conducted by senior officials with a view to bring about definite improvements in the quality of supplies. Greater stress should be laid on the rectification of substandard supplies rather than on imposing the penalties : the coal containing excess slack and shale not only results in higher consumption but also eventually creates maintenance problems in the steam locomotives.

#### 5.0. Sample check : chemical analysis.

5.1. The other type of quality check exercised is about the grade of coal offered for loading. For this check, joint samples at the loading end from loaded wagons are collected. For the purpose of this sample check, a minimum of 15 per cent\* or part thereof of the wagons in any one placement are selected jointly and at random. A door each of the wagons so selected is opened and the coal falling out collected on a tarpaulin. The gross sample is then ground and laboratory sample taken out from the ground material and analysed. If the chemical analysis of the sample shows that the coal is of a grade lower than what is shown in the invoice, the price payable for the entire placement, which was sampled, is the price of the grade as revealed by the Chemical analysis.

5.2. The total number of wagons loaded, the number of samples drawn at loading points, the number of samples sent to laboratories are given in Table 3.5 below for periods 1978-79 onwards.

Table 3.5

Samples drawn for chemical analysis

Year	Total number of wagons loaded	Number* of sample drawn at loading points	Number of samples sent to laboratories	Percentage† number of wagons covered by this check
1978-79	5,09,351	6,197	6,514	12.0
1979-80	4,92,966	7,013	N.A.	14.2
1980-81	4,83,384	9,022	9,148	18.7
1981-82	4,45,046	9,627	10,011	21.6
1982-83	4,57,277	11,887	12,771	26.0

5.3. The penalties imposed on the basis of sample results, both in terms of four-wheelers as also rupees are indicated in Table 3.6 below. :

Table 3.6 @

Penalty imposed : chemical tests

Year	Percentage of samples		Penalty imposed	
	found below grade	In terms of four-wheelers	In lakhs of rupees	
1978-79	45.1	37,458	107.8	
1979-80	42.0	33,070	109.5	
1980-81	39.6	21,371	119.6	
1981-82	48.8	48,008	256.9	
1982-83	48.0	50,949	301.1	

\* The procedure is to select 1 wagon at random out of every block of 7 wagons or part thereof. Sampling Procedure is laid down in Specification No. 436-1964 of the Indian Standards Institution.

† The number of samples drawn and the number of samples sent to laboratories do not tally as there is some overlap from the previous year.

+ Col. 3  $\times$  10  $\times$  100. Keeping in view the mix of 4-wheelers and bogies involved, number of wagons covered per sample is on an average 1024-wheelers. The percentage number wagons of covered is steadily increasing because of posting of a larger number of sampling supervisors.

It would appear that over 40 per cent of the supply of coal from the collieries is of a grade lower than that shown in the invoice and even with a coverage of 26 per cent of the total supplies, the Railways were able to effect a deduction of about Rs. 3.01 crores from the fuel bill of 1982-83.

5.4. The Study Group on Economy in Energy Consumption (1980) had recommended augmentation of the inspection organisation to cover 70 to 80 percent of the supply: the remaining 20 to 30 percent of the loading is done at night and cannot, therefore, be covered by sample checks. This recommendation was made by them so that the collieries would start ensuring that the grade actually supplied conforms to the one shown in the invoices or alternatively the recoveries for the supply of inferior coal could be raised.

5.5. We find that the Railway Board have been temporarily upgrading the posts of loading supervisors to sampling supervisors to intensify the sampling checks. This has been done in three stages :

1. Upgradation of 10 posts of loading supervisors to sampling supervisors in November, 1979 ;
2. Upgradation of 18 posts of loading supervisors to sampling supervisors in August, 1981 ; and
3. Upgradation of 14 posts of loading supervisors to sampling supervisors in March, 1983.

5.6. With the upgradation of 10 posts of loading supervisors to sampling supervisors in phase I, an increase of about 250 samples per month was achieved. Therefore, with the implementation of all the three phases, the Railways expect to increase the number of samples by 1050.† With this increase, the Railways would be able to draw about 1,500 samples per month, covering 40 percent\*\* of the total supplies made.

5.7. The Railways have been able to cover till now only 26 percent of the supplies made because the additional sampling supervisors have not been positioned. We are also told that the work of drawing samples gets hampered due to lack of transport facilities and heavy break-down of sampling trucks.

5.8. We appreciate that the posting of additional sampling supervisors alone would not by itself enable the Railways to draw out a larger number of samples, the other limiting factors being odd timings of placement, weather conditions and availability of colliery staff.

5.9. We have, therefore, looked into the issue of sample checks from another angle. We are keen that the present method of sampling should be revised with an eye on simplicity and making the results of the sample check applicable to the entire supply made by the colliery rather than to the 'placement' from which the sample is drawn.

@ Source:—Obtained from Railway Board (Also Cf. Report of the Study Group on Economy in energy consumption Section I, Coal Annexure 10).

† At the rate of 25 samples per sampling supervisor.

\*\*Number of samples drawn 10 (Each sample covers 10 wagons)

$$\frac{1,500 \times 10 \times 12 - 100}{4,57,277} = 30.4, \text{ say } 40 \text{ per cent.}$$

£ Supply made in 1982-83 Cf. Col. 2, Table 3.5.



5.10. The matter has been discussed with the Indian Statistical Institute and they are of the view that this is possible by using a statistical technique known as 'bulk sampling'. This is already being followed in respect of metallic ores. By using this technique it would be possible to work out a sampling plan in a more realistic and scientific manner.

5.11. For working out such a plan, the following information would be needed :

1. Contribution to the total variability by various sources like placement to placement; wagon to wagon within a placement, within a wagon and testing error.
2. The precision of the estimates required and scope of error that both Coal India and Railways are prepared to accept.

5.12. The information on 1 can be obtained by a sample study and after the results of that study are known, a sampling plan, which is on minimum cost but which ensures the desired levels of efficacy can be worked out.

5.13. We recommend that the Railways and the Coal India Ltd. should jointly pursue the matter with the Indian Statistical Institute and the Indian Standards Institution in order to evolve a suitable 'bulk sampling plan' so that the results of such a sampling check would be applied to the entire supply with minimum effort. Moreover with adoption of bulk sampling, the strength of staff should also get reduced. Meanwhile the Railways should urgently provide adequate transport facilities to the inspectorial staff to improve their mobility and thus enable them to draw the targetted number of samples. Let the Railways not drag their feet in ensuring that appropriate and adequate sampling is done.

#### 6.0. Downgrading of collieries.

6.1. While generally the samples 'found below grade' ranged from 40 to 50 per cent, there are a few collieries which are supplying over 70 per cent of the coal of sub-grade. The particulars of such collieries and the percentage of samples found below grade in chemical analysis are given in Table 3.7 below.

Table 3.7

#### Collieries supplying mostly sub-grade coal

Name of the colliery	Percentage of samples found below grade.*
Duelbara	94
NCP Hill	89
Madhaipur	77
Saval 'D'	70

6.2. We recommend that such collieries should be downgraded and alternative collieries should be selected.

#### 7.0. Transit and handling losses.

7.1. Traditionally, the Railways have worked to a target of 2 per cent difference in the quantity of coal load-

ed at the pit heads and that accounted for as issues. The target for transit loss is taken as 1.5 per cent and the balance 0.5 per cent is attributed to handling in the sheds.

7.2. The overall coal losses over the last few years are steadily going up : the percentage loss on account of transit and handling increased from 2.3 per cent in 1977-78 to 5.0 per cent in 1982-83. Table 3.8 give the overall percentage loss of coal in transit and handling on the Railways for the period 1978-79 onwards.

Table 3.8

Percentage loss of coal†			
Year	In transit	In handling	Total
1978-79	1.9	0.6	2.5
1979-80	2.2	0.7	2.9
1980-81	2.9	0.9	3.8
1981-82	3.9	0.9	4.8
1982-83 (upto June, 1982)	4.2	0.8	5.0

7.3. The Railway-wise percentage loss of coal for 1981-82 is given in Table 3.9 below.

Table 3.9

#### Railway-wise percentage loss of coal 1981-82.

Railway	In transit	In handling	Total
Central	4.9	0.1	5.0
Eastern	6.4	2.3	8.7
Northern	1.4	1.5	2.9
North Eastern	3.2	1.0	4.2
Northeast Frontier	3.4	0.5	3.9
Southern	1.3	0.2	1.5
South Central	1.3	0.4	1.7
South Eastern	5.0	0.8	5.8
Western	7.4	0.3	7.7
Overall average	3.9	0.9	4.8

7.4. It is a fact worth noting that the transit losses are generally much higher where the destinations are located nearer to the collieries and where the transit time between loading and consuming points is less. For example, Eastern and Central Railways which are nearer to the collieries are showing much higher losses than Northern Railway situated far away from the collieries.

7.5. We find that the loaded wagons are not always weighed at the collieries and that the weight is shown as the carrying capacity 1/2 tonnes. We are also told that wherever weight-bridges are installed and are functioning, the weighment is done when the wagon is rolling slowly over the weight-bridge with the indicator fluctuating erratically on the dial. In such a situation the chances of error in the weight of the wagon registered on a conventional indicator type of weight-bridge are quite high. This aspect was gone into by the Study Group on Economy in Energy Consumption, and they had recommended that the Railways should go in for more sophisticated type of weighbridges, which print out weight of the consignment.

\* These percentages are from January 1981 to October 1981 and are the latest available in Railway Board.

† Obtained from the Railway Board.



7.6. We had also ourselves constituted Working Groups on Consumers\* and on Coal Transport\*\*. The Working Group on Consumers felt that arrangements should be made for weighment of all loaded wagons so that coal consumers are not penalised by showing on the railway receipt the weight of coal as equal to carrying capacity 12 tonnes though actually it might be much less, or much more in which case the Railways lose on freight. The Working Group on Coal Transport also recommended that a new colliery must have arrangements for electronic weighment.

7.7. We are of the view that at least at major loading points, electronic weigh-bridges should be installed so as to eliminate errors in weighment, ensuring thereby correct weight being recorded on the railway receipt.

7.8. It is understood that the Railways are asking to collieries to instal electronic weigh-bridges at sidings. While Coal India Ltd. has already plans to instal such weight-bridges, they have represented that the Railways should be quick in the grant of rebate† and that the quantum of rebate should be commensurate with the capital investment, maintenance and labour cost involved in the installation of such weigh-bridges. We recommend that the Railways should look into this representation expeditiously.

7.9. We find that the receiving sheds work out the weight of coal based on the volumetric measurements and the density of the grade of coal. Often the grade of coal mentioned on the wagon label is different from the actual grade of coal supplied, which results in application of incorrect density in arriving at the weight of coal received. In these circumstances, we appreciate that it is not possible in every case to precisely determine the losses in transit. None-the-less as the same system has been followed all along, an year-wise comparison would not be unrealistic. Such a comparison does indicate a positive uptrend in the percentage losses.

7.10. The Study Group on Economy in Energy Consumption (1980) in their report had recommended‡ that the target of 1.5 per cent transit losses set by the Railway Board needed a downward revision to 0.5 per cent. What to say of this revised target, the Railways have been unable to maintain even the earlier target of 1.5 per cent. The transit losses on Western and Eastern Railways in 1981-82 were as high as 7.4 per cent and 6.4 per cent respectively. This is disquieting and points to the need for urgent attention in the matter.

7.11. The Committee understand that a large number of coal wagons received in the sheds on South Eastern Railway come with their doors open. This menace is mainly in the Dankuni area. In one case of a rake of 58 four-wheelers received at Waltair on 1 February 1983 the actual receipt of coal was 644 tonnes as against the total invoiced quantity of 1,163 tonnes, the transit loss being as high as 44.7 per cent. The vandalism on coal rakes by opening the doors of rakes enroute is thus operating on a large scale in some of the areas known for their notoriety.

7.12. Instructions do exist for spraying lime over the top surface of coal after loading so that through visual checks at strategic points the sections prone to pilferage

could be detected and security measures strengthened on the specific section/yards. But these instructions are not being implemented reportedly for want of supporting infrastructure. This should be looked into on a high priority and the procedure enforced.

7.13. The problem of thefts in transit was also dealt with extensively by the Expert Committee on Coal Consumption on Railways (1958)§ who pointed out that such stolen coal was passed on to local dealers for sale as fuel or to small industries, and that to check thefts, the local authorities should question the dealers regarding the source of supply and examine their accounts. The U.P. Government had taken these steps and the position had improved in a number of its areas.

7.14. It appears to us that the theft of coal both during the run and in yards and sheds is committed in an organised manner, in which the possibility of collusion of railway staff cannot be ruled out. Because the requirement of coal on the Railways is continuously diminishing as a result of change of traction from steam to diesel/electric, the percentage of losses is on the rise as the stolen quantity is roughly around the same level.

7.15. It appears to us that the Railways have not so far adopted any worthwhile strategy to minimise such thefts and have more or less preferred to overlook the situation. This in our opinion is self-defeating as the Railways will nily have to carry on with steam traction almost till 1995.

7.16. Unless the culprits are apprehended and due punishment is meted out to them, it would not be possible to put an end to this evil. It may be useful for the Railways to form special squads comprising Fuel Inspectors, RPF and GRP and put them under the control of Chief Security Officer and Additional Chief Mechanical Engineer (Fuel). The personnel should be specially selected, i.e., those of proven integrity and competence. The squads should undertake spot verification of coal in the sheds/yards and identify notorious sections where coal is being pilfered. They should organise frequent raids to arrest the persons involved. Prosecution proceedings should be launched with speed. The working of these squads would also need to be monitored.

7.17. In our report on Security (Part-VII) we have made specific recommendations for control of alarm chain pullings, ticketless travelling, hosepipe disconnections, and other crimes on trains by network action and strategies. These could also include 'coal thefts in run' to good advantage. Even otherwise such action as recommended by us when seriously implemented would help in sizeably bringing down organised pilferage of coal on the run.

## 8.0. Coal consumption rate.

8.1. The statistical index for determining the efficiency of utilisation is the consumption rate of coal in kilograms per thousand gross tonne-kilometres. This index†† helps in judging the performance of the Railways independent of the variations in the volume of traffic.

8.2. The rate of coal consumed per thousand gross tonne-kilometres has shown an upward trend. On the broad gauge, the increase during 1962-63 to 1981-82 was

\* Chairman, Shri C.S. Swaminathan, Former Secretary to the Government of India.

\*\* Chairman, Shri K.S. Banerjee, Former General Manager, Movement, Steel Authority of India.

† Wherever weigh-bridges are installed by Coal India Ltd., the Railways grant them a rebate.

‡ Para 4.04, of Chapter IV of the Report.

§ This Committee was appointed by the Ministry of Railways and was headed by Shri Karnail Singh, at that time Member, Engineering, Railway Board.

†† This index does not throw light on the magnitude of thefts and pilferages from wagons in transit from pit-heads to sheds and from shed premises themselves.



40.8 per cent for passenger traffic and 109.4 per cent for freight traffic. Table 3.10 gives the coal consumed per thousand gross tonne-kilometres, service-wise and gauge-wise from 1962-63 onwards.

8.3. There has been a marked increase in the rate of consumption per 1,000 gross tonne kilometres, particularly on the broad gauge, from 1976-77 onwards. How fast has been the rise for passenger and goods traffic is depicted graphically

8.4. It is often argued that the rise in the consump-

tion rate in passenger service is due to a drop in the average load, a larger number of stoppages due to alarm-chain pulling and hosepipe disconnections, lesser percentage of mail and express trains, and a drop in average speed and the consequences of strikes and go-slows.

8.5. On freight, the increase in the rate of consumption is also attributed to strikes by running staff, a large number of locomotives running without brick arch, drop in engine utilisation, drop in average load and such other causes. The number of factors enumerated by the

Table 3.10

Coal consumption (in kilograms per thousand gross tonne kilometres)

Year	Broad Gauge				Metre Gauge			
	Passenger*	Index	Goods*	Index	Passenger*	Index	Goods*	Index
1962-63	53.9	100.0	43.6	100.0	59.5	100.0	54.5	100.0
1963-64	54.5	101.8	46.2	105.9	58.8	98.8	55.5	101.8
1964-65	54.1	100.4	40.4	113.3	58.4	98.1	56.5	103.7
1965-66	54.5	101.1	50.3	115.4	57.6	96.8	55.7	102.2
1966-67	56.2	104.3	53.3	122.2	58.2	97.8	56.9	104.4
1967-68	59.8	110.9	56.4	129.4	60.3	101.3	60.0	110.1
1968-69	58.1	107.8	57.4	131.7	59.7	100.3	59.4	109.0
1969-70	58.3	108.2	59.7	136.9	59.7	100.2	61.5	112.8
1970-71	57.1	105.9	58.9	135.1	59.9	100.7	61.3	112.5
1971-72	58.3	108.2	60.9	137.6	60.5	101.7	63.6	116.7
1972-73	57.8	107.2	60.5	138.8	61.0	102.5	62.6	114.9
1973-74	59.0	109.5	62.5	143.3	67.1	112.8	67.3	123.5
1974-75	61.8	114.7	62.5	143.3	67.6	113.6	67.1	123.1
1975-76	59.5	110.4	63.8	146.3	67.8	113.9	68.0	124.8
1976-77	59.6	110.6	63.4	145.4	66.8	112.3	67.2	123.3
1977-78	62.2	115.4	65.7	150.7	68.8	115.6	68.7	126.1
1978-79	67.1	124.5	74.1	170.0	70.6	118.7	71.6	131.4
1979-80	69.8	129.5	83.0	190.4	73.8	124.0	75.0	137.6
1980-81	75.2	139.5	91.0	208.7	78.7	132.3	82.1	150.6
1981-82	75.9	140.8	91.3	209.4	77.5	130.3	71.4	131.0

Source.—Annual Statistical Statements, Statement No. 27(6).

Railways are so large that without a detailed study of some of the sheds, it is impossible to know what percentage of increase in the consumption rate can be attributed to :

1. Inferior quality of coal.
2. Poor maintenance of engines.
3. Fall in standards of skill and experience of the running and maintenance staff.
4. Trip rations not fixed scientifically.
5. Poor operating practices.

8.6. We will now discuss these issues in detail one after another, as each one of them is important enough not to be overlooked.

#### 9.0. Poor quality of coal.

9.1. One of the major factors which adversely affects the rate of consumption is the quality of coal. For instance, it has been empirically established† that for every 1 per cent increase in ash, the consumption of coal has been found to increase by about 2 to 2.5 per cent.

9.2. As already indicated in Table 3.5, about 45 per cent of the samples tested had inferior grade of coal.

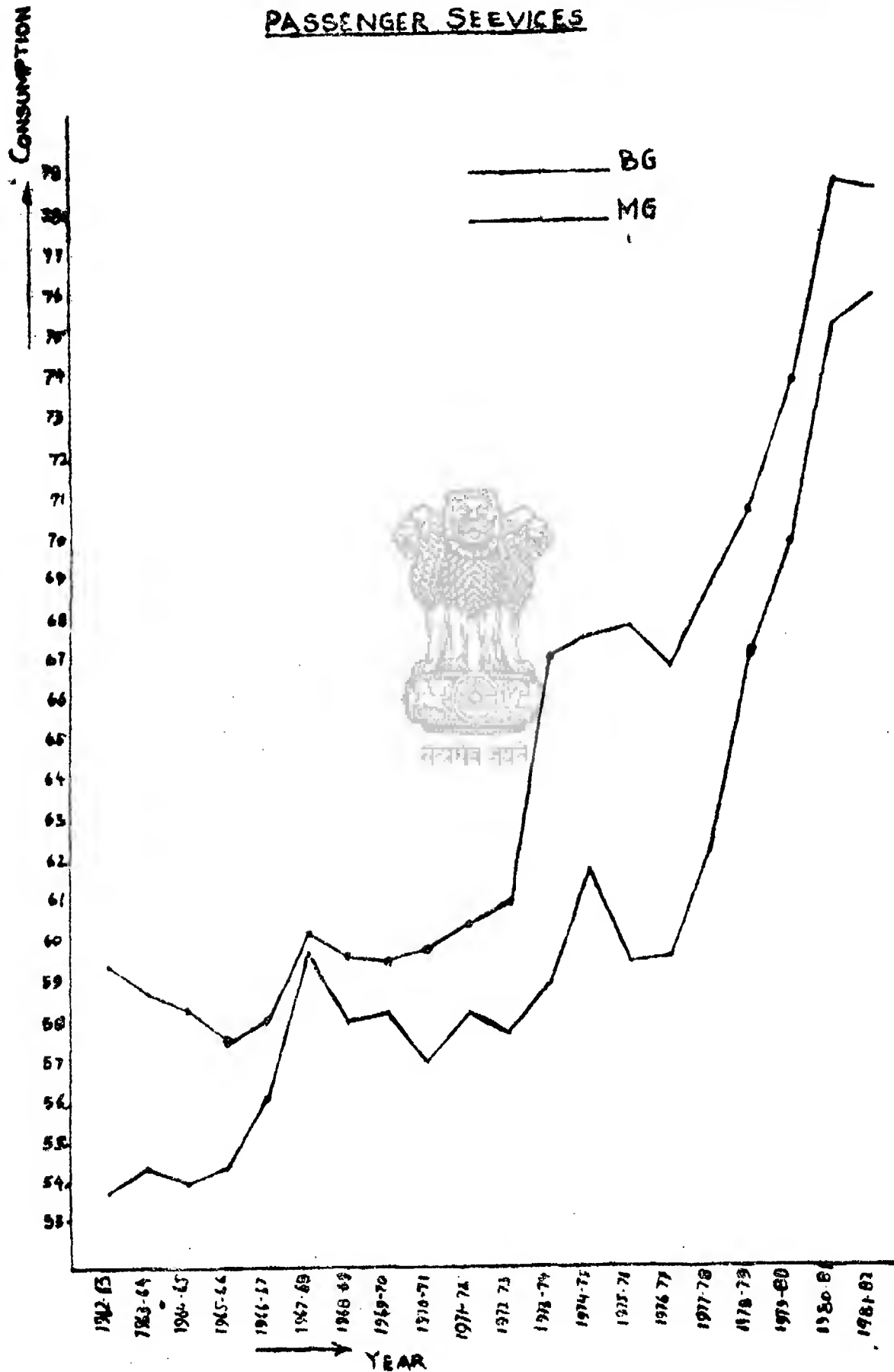
\* This includes proportion of mixed traffic.

† Para 19, of Chapter III of the Report of the Expert Committee on Coal Consumption on Railways, 1958.



COAL CONSUMPTION (IN KILOGRAMS PER THOUSAND  
GROSS TONNE KILOMETRES)

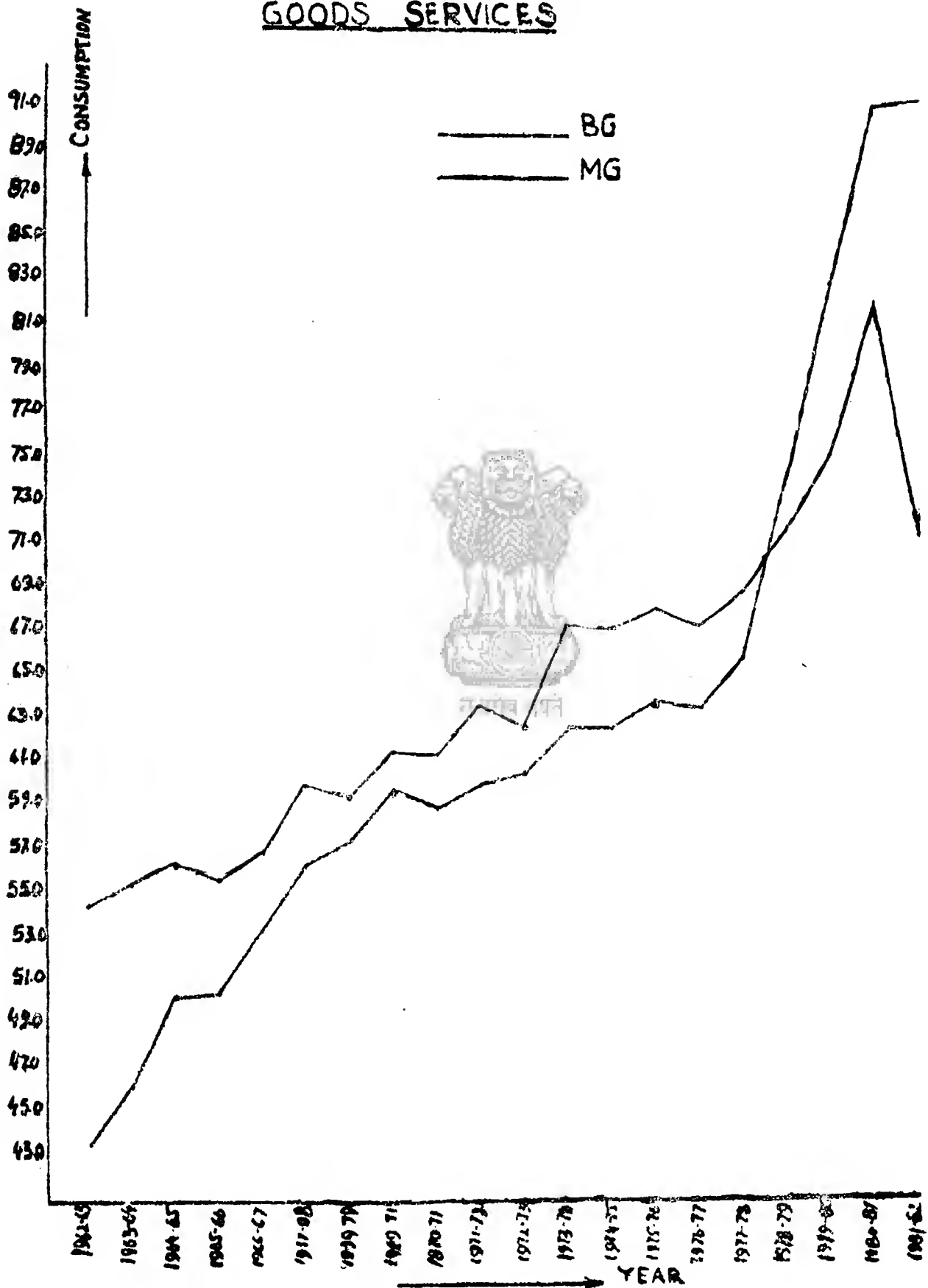
PASSENGER SERVICES





# COAL CONSUMPTION (IN KILOGRAMS PER THOUSAND GROSS TONNE KILOMETERS)

## GOODS SERVICES





9.3. Since this, however, has been a perennial feature and the percentage of coal supplied below grade has not materially varied from year to year, the quality of coal would not have played a significant part in the relative increase in the rate of coal consumed per thousand gross-tonne-kilometres.

#### 10.0. Poor maintenance.

10.1. Another important factor for excess in fuel consumption is the poor mechanical condition of the locomotives. It was estimated by the Expert Committee on Coal Consumption on the Railways (1958) that the unsatisfactory valve gear adjustments and the steam leaks, arising from excessive wear of valve and piston rings and glands, can result in excess consumption by about 5 per cent. It has also been assessed that the damaged or absent brick arch fittings can lead to an increased consumption of about 10 per cent.

10.2. The Study Group on Economy in Energy Consumption (1980) had also studied this problem. They considered that increase in consumption for an 'absent' brick arch is around 10 per cent and for a 'partial' brick arch 5 percent. This Group had also carried out some random checks on locomotives and found that 10 per cent of them were without brick arches and another 20 per cent with partial brick arches. With these percentages, there would be a 2 per cent \*increase in fuel consumption.

10.3. It is understood that some steam locomotives continue to run without brick arches or with partial brick arches. The deficiency is particularly pronounced on Central Railway where in September 1982, 15 percent of the locomotives in use were not fitted with brick arches and another 41 percent were partially fitted with brick arches.

10.4. The steam locomotives, which at one time were hauling more of through freight than van and shunting traffic, are now deployed mainly on the latter. Table 3.11 gives the position of train Kilometres pertaining to steam traction covering a period of seventeen years.

10.5. The hauling power of a locomotive required for running van and shunting service is less than that needed for running through goods services. While, therefore, deploying higher hauling power steam locomotives on van and shunting services, the Railways

Table 3.11

Train kilometres (steam engine) Through goods,  
and van & shunting goods

Year	Through goods	Van & shunting goods
1965-66	46,986	24,929
1967-68	37,058	23,695
1970-71	24,445	22,832
1973-74	16,995	17,573
1976-77	12,030	19,631
1979-80	4,292	13,819
1981-82	1,796	9,750

\*5% of 20% = 1 per cent  
and 10% of 10% = 1 per cent

Total = 2 per cent

should have reduced the fire-grate area† to cut down coal consumption.

10.6. We understand that this has generally not been done. If the Railways fail to reduce the fire grate area, the rate of fuel consumption per thousand GTKMs will continue to rise with the increase in the proportion of van and shunting services to through freight services.

10.7. The repairs and maintenance of steam locomotives is altogether unsatisfactory. There is an atmosphere of laxity bordering on neglect, and this has resulted in more and more number of steam loco failures causing considerable loss to the productivity of the system. One would have expected that with the number of steam locomotives getting less and less, the incidence of their failures would come down; but because of poor maintenance the trend is just the other way about. Table 3.12 gives the position of steam loco failures for different gauges from 1976-77 onwards.

Table 3.12  
Locomotive failures : steam

Year	Broad gauge	Metre gauge	Narrow gauge
1976-77	1,033	775	100
1977-78	1,245	713	209
1978-79	1,449	885	234
1979-80	1,591	1,106	252
1980-81	1,755	1,473	222
1981-82	1,700	1,326	255

10.8. We learn that some loco failures take place not too long after the locomotives are sent out from the work shops and sheds, but hardly and responsibility is fixed for such poor quality of repairs and maintenance. It needs no emphasis to say that while steam locomotives have to remain on line, their proper maintenance cannot be relaxed.

10.9. We, therefore, recommend that no more complacency should be shown in this regard. To avoid wasteful expenditure it is essential that appropriate measures are taken to keep the steam locomotives in good running condition. The Railway should improve the stock position of fire bricks and run the steam engines with proper brick arches. Wherever necessary, the fire-grate area should be reduced.

10.10. We cannot overlook that steam locomotives continue to consume as of now coal roughly worth of Rs. 200/- crores annually.

#### 11.0. Dilution of calibre

11.1. In Part V of our Report we have already taken a note of the denudation of the manpower-base of steam locomotives to strengthen priority areas like diesel and electric traction. One of the results of this unavoidable policy is that skill and calibre of the staff now left to manage the steam locomotives is poor, and this is one of the causes for the increased consumption of coal. We had accordingly suggested that the retention of skilled manpower on steam has to continue for 12 to 14 years.

†WG locomotive have a fire grate area of 46 sq. ft. as against 30 sq. ft. fire grate area of a standard shunting locomotive (WS).



11.2. Wherever the attrition has overtaken the phasing out of steam locos and some recruitment is unavoidable, we suggest that the future recruits should meet the educational and skill standards specified for diesel traction. The expert committee recommended by\*us\* in Part V of our Report would look into this aspect also.

#### 12.0. Trip rations.

12.1. It is observed that instructions exist to fix coal trip rations. For fixing these rations for each section, three round trips are to be conducted and separate rations fixed for the up and down directions. The senior fuel inspector of the concerned Division has to apply a theoretical method<sup>@</sup> for a percentage check on the trip rations fixed by practical trials and demonstrations, and wherever the difference between the theoretical and practical figures is large, the fuel trials have to be conducted again for a re-check. The trip rations are to be undertaken twice for a year fixing rations for the new trains introduced as well as for re-checking the existing trip rations, should this be necessary.

12.2. These trip rations are fixed with a view to keep a surveillance on the coal consumed by the locomotive during the run, and to take appropriate corrective action for the excess consumption which may be due to locomotive defect, traffic detentions, engineering restrictions and theft of coal from the tenders.

12.3. We find that trip rations have generally not been fixed scientifically. One of the reasons advanced for this is the shortage of fuel inspectors. The fuel inspector is supposed to travel with the locomotive with varying loads and speeds to fix the trip ration. Considering that there are innumerable adverse operating factors such as the type of loads which the fuel inspector wants not being available or the engine not being up to the desired level of maintenance, etc., it takes the fuel inspector a minimum of 5 to 7 days to fix one trip ration; and looking to the manifold duties he has to perform, it is reported that he finds it difficult to get time for proper field trials.

12.4. We have also noted with concern that the trip rations, wherever fixed, have not been test-checked by the Senior Mechanical Engineers by undertaking actual field trials. If the trip rations are not properly fixed, there cannot be any control over the coal consumed during a run.

12.5. This aspect was also studied by the Expert Committee on Coal Consumption on the Railways (1958) and they stated† "...as trip rations are not properly fixed the engine crew dispose of coal by dropping it from the engine tenders at watering stations or other convenient places for the benefit of interested parties, and also by dropping (during fire clearing operations) half-burnt coal in loco and traffic yards. The situation has been aggravated by the rising costs of coal, the difficult economic conditions, and the development of small industries in towns for which supplies of coal are inadequate. It is a socioeconomic evil."

12.6. We endorse the views of the Expert Committee on Coal Consumption on Railways (1958) and recommend that it is time that the Railways paid urgent attention to this important matter if they have to properly control their fuel bill.

12.7. The Divisional strength of Fuel Inspectors should be augmented, if necessary, and some inspectors should be earmarked exclusively for fixation of trip rations. Likewise at least one of the Assistant Mechanical Engineers or a Divisional Mechanical Engineer should be able to pay exclusive attention to economy in coal consumption.

12.8. A time-bound programme should be laid down for proper fixation of trip rations and a monitoring system devised to watch the progress of implementation at the zonal level.

#### 13.0. Operating practices —

13.1. With the advent of diesel and electric traction on the trunk and main line routes of the Indian Railways, steam traction has taken a back seat. On the broad gauge in particular, steam locomotives are being used mainly on inferior services in freight movement. Even in respect of passenger services, these are being used generally on sectional passenger trains and on the branch lines.

13.2. The relegation of steam locomotives to inferior services would lead to a higher rate of consumption of coal to a certain extent. We have in the preceding paragraphs already dealt with the effect of increase in the proportion of van and shunting engines. We are also told that because the average trailing load has gone down, the rate of consumption has gone up.

13.3. We are prepared for some rise in consumption on these accounts. But in our opinion consumption of coal is precipitously high, and is not coming down even with considerable reduction in the steam hauled traffic.

13.4. We have analysed the data about the average load. Table 3.13 below gives the position from 1962-63 onwards both for broad and metre gauge goods traffic.

Table 3.13  
Average loads† (in tonnes)

Year	Broad gauge	Metre gauge
1962-63	1,349	664
1963-64	1,327	675
1964-65	1,286	658
1965-66	1,290	677
1966-67	1,274	669
1967-68	1,284	673
1968-69	1,282	672
1969-70	1,264	659
1970-71	1,254	673
1971-72	1,259	687
1972-73	1,265	686
1973-74	1,248	677
1974-75	1,290	699
1975-76	1,235	683
1976-77	1,174	665
1977-78	1,201	668
1978-79	1,162	705
1979-80	1,110	704
1980-81	1,052	691
1981-82	1,051	669
Average	1,203	681

Source.—Annual Statistical Statements (Statement No. 23).

\* Paragraph 3.2 of Chapter III.

@ The theoretical method is indicated in Appendix J (Item No. 21) of the Report of the second meeting of Indian Railways Fuel Committee, 1949.

† Para 41 of Chapter V of the Report.

‡ This includes proportion of mixed traffic.



13.5. While there has been a slight fall\* in the average load of the broad gauge, no such trend has been noticed in the case of the metre gauge. It is, therefore, not clearly evident that this has been a significant factor towards increase in the rate of fuel consumption.

13.6. The Committee are inclined to believe that to some extent there is positive scope for economising on the consumption of coal if, despite the fact that steam locomotives will be gradually phased out, rationalisation of operating practices in relation to traffic still catered for by steam traction is seriously taken in hand. This is the impression we gathered from our visits to the

Railways and inspection of yards and loco sheds and on the basis of discussions held with railway officers and staff.

13.7. We also undertook some random studies about the movement of steam-hauled trains on the Moradabad-Hapur-Ghaziabad section of Northern Railway and Amla-Itarsi section of Central Railway. 39 van and shunting trains on the Moradabad-Hapur-Ghaziabad section of Northern Railway, and 32 through goods trains on Amla-Itarsi section of Central Railway were selected by us. The results of the study are given in Table 3.14

Table 3.14

## Detection

Section	Pre-departure detention**		Hours on run		Detention enroute		Total hours on road		Post Arrival detention
	In shed	In yard	As per Time Table	Actual	As per Time Table@@	Actual	As per Time Table@@	Actual	
1	2	3	4	5	6	7	8(4)+(6)	9(5)+(7)	10
Moradabad-Ghaziabad (140 Kms.)	1'54"	1'-46"	5'-03"	6'-11"	10'-37"	23'-32"	15'-40"	29'-43"	11'-32"
Moradabad-Hapur (104 Kms.)	1'-54"	1'-46"	2'-42"	3'-58"	6'-28"	12'-43"	9'-10"	16'-41"	5'-09"
Ghaziabad-Moradabad (140 Kms.)	0'-48"	1'-39"	5'-17"	6'-09"	10'-38"	14'-41"	15'-55"	20'-50"	14'-09"
Hapur-Moradabad (104 Kms.)	Open	Timings	3'-52"	3'-43"	5'-53"	12'-57"	9'-45"	16'-40"	14'-09"
Amla-Itarsi (130 Kms.)	0'-40"	1'-32"	...	5'-19"	...	9'-14"	...	14'-33"	2'-05"
Itarsi-Amla (130 Kms.)	0'-13"	0'-30"	...	4'-30"	...	5'-20"	...	9'-50"	40'-00"

13.8. The study overall reveals that, on an average, the trains hauled by steam locos are having late start by  $3\frac{1}{2}$  hours on Northern Railway and  $1\frac{1}{2}$  hours on Central Railway. The time taken for actual run is also much more than provided for. The detentions during the run of van and shunting trains are almost twice of what is justified on the basis of the working timetable. The post-arrival detentions† are abnormally high. The steam locos have to remain in steam during these detentions resulting in a higher rate of coal consumption.

13.9. The Committee appreciate that it is difficult to analyse a situation like this from the working graphs, as the relative contribution of the several factors is difficult to assess. It is also accepted that certain detentions are more 'resultant' than 'contributory'. For instance, if a locomotive is turned out late by the shed, it may create very serious detentions in the yard. Contrarily, if detentions on the section and in the terminal yards are high, these would effect the timely availability of the locomotives from the shed.

13.10. Nevertheless, the analysis made by us in respect of two major routes on Northern and Central Railways is indicative of certain basic trends. These do show that there is enormous scope for rationalising the running of trains on steam traction to reduce detentions caused in the sheds, on the run and in the terminal yards.

13.11. It has come to the notice of the Committee that excellent arrangements of rationalised running of work trains and shunting and van goods trains have been organised on the Indian Railways on certain Divisions. Thus, for instance, a few years back, a complete system of rationalisation was introduced on the Delhi Division of Northern Railway.

13.12. This commendable effort came to the notice of the Committee in the Delhi Division's Report entitled 'Project Kilometrage' issued in 1977. This Report had documented a detailed programme of rationalisation which was organised and enforced during 1976-77 and beneficial results achieved in regard to the running, inter-alia, of work trains, pilots and shunting-cum-van goods trains on both steam and diesel traction. On the Delhi Division, the diesel traction used for such services comprised mostly WDS 4 locomotives.

13.13. The arrangements also paid good dividends. It is, however, unfortunate that on the Railways in general we noticed a tendency not to capitalise on such improvements and to allow the arrangements to slide back to routine, and disorganisation. Even the Delhi Division where the experiment was organised for a number of years has registered a slide-back.

13.14. The Committee, therefore, recommend that all over Indian Railways such efforts at rationalisation

\* The average load on BG fell from 1,349 tonnes in 1962-63 to 1,061 tonnes in 1981-82.

@ The average load in MG increased marginally from 664 tonnes in 1962-63 to 669 tonnes in 1981-82.

\*\* Difference between the scheduled and actual departure of trains.

@@ There is no printed goods trains working Time Table on Central Railway. Trains are run on 'open timings'.

† Time taken by a steam loco from its arrival at the destination yard to its coming back to the loco point (Bahr line) via the loco

shed for working the next outward load.

Note.—The period selected in the case of Northern Railway was 1st April 1983 to 22nd April 1983 and the train Nos. were M37 and M38. On the Central Railway the period selected was 1st February 1983 to 10th February 1983 and the trains Nos. were F/30 K30, S30 and BOX specials.

† Time taken by a locomotive from its arrival at the destination yard to its going back to the loco point (Bahr line) for destination outward load.



tion of steam-hauled trains, particularly in the category of inferior freight services, are immediately organised. While doing this, the following factors should be kept in mind.

1. The paths worked out for steam traction should not be cavalierly ignored, even in the case of mixed traction. We do not think much of running trains 'on open timings'. It is appreciated that diesel/electric traction would have preference over steam, but this should not be at the cost of gross indifference of steam-run services. A scientific compromise is necessary, and this should be ensured by appropriate charting of paths which once legislated, should be observed.
2. There has been serious deterioration in the standard of maintenance of steam locomotives in both sheds and workshops, and this has to be arrested even when it is known that steam traction has to be gradually phased out by 1996. So long as these locomotives are on line, they have to be in good fettle, as otherwise they will work like poison while on the run, not only in relation to the steam-hauled trains, but also the rest of them.
3. There is no merit in a rather widely prevalent practice of relegating steam loco failures as time failures and time failures as disturbances, as this has all along proved counter productive.
4. The experiments conducted on Delhi Division for optimisation of steam locomotives, which we endorse should be implemented.

13.15. The analysis also emphasises in a tell-tale manner the need for early phasing out of steam locomotives. Once a decision has been taken that no more steam locomotives will be manufactured in the country, their efficacy and performance are bound to gradually deteriorate. We are also not in favour of major inputs on the existing fleet of steam locomotives as they have got to fade out. We are also aware of the experiments on certain sections of the Indian Railways where diesel traction was used for running of sectional work trains, to very good advantage. Since, however, these were main-line locomotives, there was an element of wastage.

13.16. It is, therefore, necessary that, as already recommended\* by us, arrangements are made for introducing diesel and electric locomotives of appropriate horse power to attend to sectional work trains. This will not only avoid the irrational mixing of traffic, but will also enable the Railways to properly organise transportation practices. This would also reduce fuel consumption because, in any case, diesel and electric engines can be switched off, if the expected detention is of more than one hour. We have already stated† in Part II of our Report on Transportation that on the basis of 1979-80 prices, the overall recurring savings that would accrue to the system after the full replacement of steam services would be more or less in the range of Rs. 185 crores.‡

#### 14.0. Excess number of engines on line.

14.1. The traffic hauled by steam engines has been steadily going down, the shortfall is more pronounced in the case of freight traffic. During the interregnum 1964-1982, the gross tonne kilometres on broad gauge have fallen by 44.5 per cent in the case of passenger traffic

and 86.0 per cent in the case of freight traffic. During the same period, the fall in gross tonne kilometres on metre gauge has been 21.2 per cent for passenger traffic and 79.0 per cent for freight traffic. Tables 3.15 (below) and 3.16 (page 91) give the position of typical indices both for broad and metre gauges after 1964-65 :

Table 3.15

#### Broad gauge : Passenger

Year	Train Kilometres (in millions)	Index	Gross tonne kilometres (in billions)	Index	Vehicle kilometres (in millions)	Index
1964-65	120.0	100	69.7	100	2,425	100
1967-68	119.5	99.5	67.6	96.6	2,283	79.5
1970-71	109.5	91.3	63.2	90.6	2,114	87.2
1973-74	94.2	78.5	58.2	83.5	1,894	78.1
1976-77	91.7	76.4	55.8	80.1	1,818	75.0
1979-80	82.3	68.6	47.1	67.6	1,462	60.3
1981-82	71.1	59.3	38.7	55.5	1,180	48.7

#### Broad Gauge Freight

1964-65	76.2	100	102.1	100
1967-68	60.3	79.6	81.2	79.5
1970-71	47.2	61.9	62.1	60.9
1973-74	34.5	45.3	45.5	44.5
1976-77	31.6	41.5	39.6	38.8
1979-80	18.1	23.7	22.0	21.6
1981-82	11.5	15.1	14.3	14.0

Note.—The above figures include proportion of mixed traffic also.  
Source.—Annual Statistical Statements—Statement Nos. 16, 17 and 19(a).

Table 3.16

#### Metre Gauge : Passenger

Year	Train kilometres (in millions)	Index	Gross tonne (in Kilo meters)	Index	Vehicle kilometres (in millions)	Index
1964-65	72.8	100	26.5	100	1,371	100
1967-68	76.0	104.4	28.2	106.5	1,423	103.7
1970-71	77.8	106.9	29.9	113.0	1,451	105.8
1973-74	60.8	83.5	23.0	87.0	1,140	83.1
1976-77	68.7	94.5	27.0	101.8	1,260	91.9
1979-80	59.7	82.1	23.3	88.0	1,048	76.4
1981-82	53.7	73.8	20.9	78.8	907	66.1

#### Metre Gauge Freight

1964-65	45.1	100	31.3	100.3
1967-68	39.5	87.6	27.6	88.4
1970-71	34.5	76.6	24.1	77.0
1973-74	22.3	49.6	15.5	49.7
1976-77	24.6	54.5	16.9	54.2
1979-80	16.8	37.3	12.3	39.4
1981-82	9.2	20.4	6.5	21.0

Note.—The above figures including proportion of mixed traffic also.

Source.—Annual Statistical Statements—Statement Nos. 16, 17 & 19(a).

14.2. It is noteworthy that the number of steam engines on line has not gone down in proportion to the fall in the steam-hauled traffic. Table 3.17 (page 92) gives the position of steam engines on line, both on broad and metre gauges, from 1964-65 onwards.

\* Para 4.4 of Chapter VII, Report on Transportation, Part II.

† Para 3.0 of Chapter VII.

‡ These have been worked out on the basis of differential in the diesel line haul cost and steam line haul cost and should not be confused with the savings in coal consumption discussed in this Chapter.



14.3. Though during 1964-1982, the passenger traffic on broad gauge has fallen by about 44 per cent and goods traffic by 86 per cent, the reduction in the number of locomotives on line has been only 34 per cent. On the metre gauge, the passenger traffic has fallen during the same period by about 21 per cent and goods traffic by 79 per cent, but the locomotives on line have gone down only by 14 per cent.

Table 3.17  
Engines on line

Year	Broad gauge	Metre gauge
1964-65	6,613	3,061
1965-66	6,587	3,604
1966-67	6,421	3,550
1967-68	6,279	3,551
1968-69	6,079	1,552
1969-70	5,927	3,504
1970-71	5,689	3,407
1971-72	5,484	3,361
1972-73	5,367	3,272
1973-74	5,275	3,140
1974-75	5,196	3,071
1975-76	5,113	3,015
1976-77	5,019	2,984
1977-78	4,888	2,953
1978-79	4,828	2,932
1979-80	4,697	2,920
1980-81	4,532	2,852
1981-82	4,340	2,622

14.4. The position is depicted graphically at pages 93 & 94. The slope of the curve representing the goods traffic handled is much steeper than the slope of engines on line curve. Clearly, the steam engines on line are far in excess of the actual requirements which results in avoidable expenditure in terms of maintenance, staff, operating costs and fuel consumption.\*

14.5. In the year 1982-83, till December 1982, 900 steam locos were stored away from active service. Most of these locomotives have not outlived their normal age of retirement but have been kept out of a commission to reduce the working expenses.† Even though a large number of engines have been withdrawn from the service, keeping them in the sheds takes away much useful space and some expenditure is also incurred on such locomotives for guarding and maintaining them. The storing away of part of the surplus locos is certainly not a satisfactory solution to the problem.

14.6. We also recommend that the excess number of steam locos should be withdrawn from line forthwith. These locos should be condemned instead of storing them away in the sheds. There should be no hesitation in condemning the locos even if they have not lived their entire life. This advanced condemnation would, in the long run, be better for the system from the econo-

mical and operational point of view. It may even be possible to sell some of these locomotives to industrial and mining organisations in their present condition.

14.7. It is understood that the existing procedure for advanced condemnation of steam locomotives is dilatory and cumbersome. We recommend that the matter should be reviewed by the Railways and a simple and a quick method devised for steam locomotives on a priority.

15.0. Top-management controls : corporate targets for coal consumption.

15.1. In Part II of our Report on Transportation and later in Part V of our Report on Production and Maintenance of Rolling Stock we have emphasised‡ that the phasing out of steam should be done to long-term plan which is not only in overall numbers but is locational and service-wise.

15.2. The idea behind this recommendation was that the Railways should be able to achieve the most-streamlined transition with maximum economy. In accordance with such a programme, it should be possible for the Railways to have before them a clear target of a total consumption of coal during each year. This target should be further amplified to make it service-wise and shed-wise.

15.3. It is only with a deliberate plan of this kind that the management on the zonal railways will be able to exercise a continuity of control and surveillance of the programme of phasing out steam locomotives, and correlate physical targets with expenditure.

16.0. Monetary savings.—

16.1. There being many imponderables, it is not possible to accurately quantify in monetary terms the recommendations and measures suggested by us in this chapter. The savings would depend upon the extent to which the Railways are able to successfully bring about the basic improvements suggested by us.

16.2. Broadly, the monetary savings that would accrue to the system would be of the order of Rs. 38 crores per year :—

	Rupees in crores
1. By improving the mobility of sampling supervisors and revising sampling procedure.	9.24‡
2. By restricting handling and transit losses to 2 percent of the supplies.	6.75@
3. By bringing about basic improvements in maintenance and operation.	22.50†
Total	38.49

\* Also Cf. para 3.8 of Chapter VII of this Report.

† Indian Railways Year Book 1981-82.

‡ Para 4 of Chapter VII of Part II and Para 3 of Chapter III of Part V.

§ With a coverage of 21.6 per cent of the total supplies in 1981-82, a deduction of Rs. 2.56 crores was made. If, therefore, 100 percent supplies are covered, the Railways would be able to deduct Rs. 11.8 crores. The savings would thus be Rs. 9.24 crores. Alternatively, with improvement in quality of coal, the coal consumption and expenditure on maintenance will go down leading to possibly a much higher economy.

@ The over-all percentage loss of coal in transit and handling is 5 percent. If this is reduced to 2 per cent, the savings would be 3 per. cent of the annual coal bill of about Rs. 25 crores,

which is equal to Rs. 6.75 crores.

£ The Committee hope that on implementing the recommendations made, the Railways would be able to go back to their standard of performance in matters of fuel consumption to the level of 1977-78. In that case, fuel consumption would reduce by 18 percent, 28 percent, 11 per cent and 4 per cent in respect of Broad Gauge passenger traffic, Broad Gauge goods traffic, Metre Gauge passenger traffic and Metre Gauge goods traffic respectively. It is, therefore, reasonable to anticipate at least an improvement of 10 percent which would result in saving of roughly Rs. 22.5 crores.

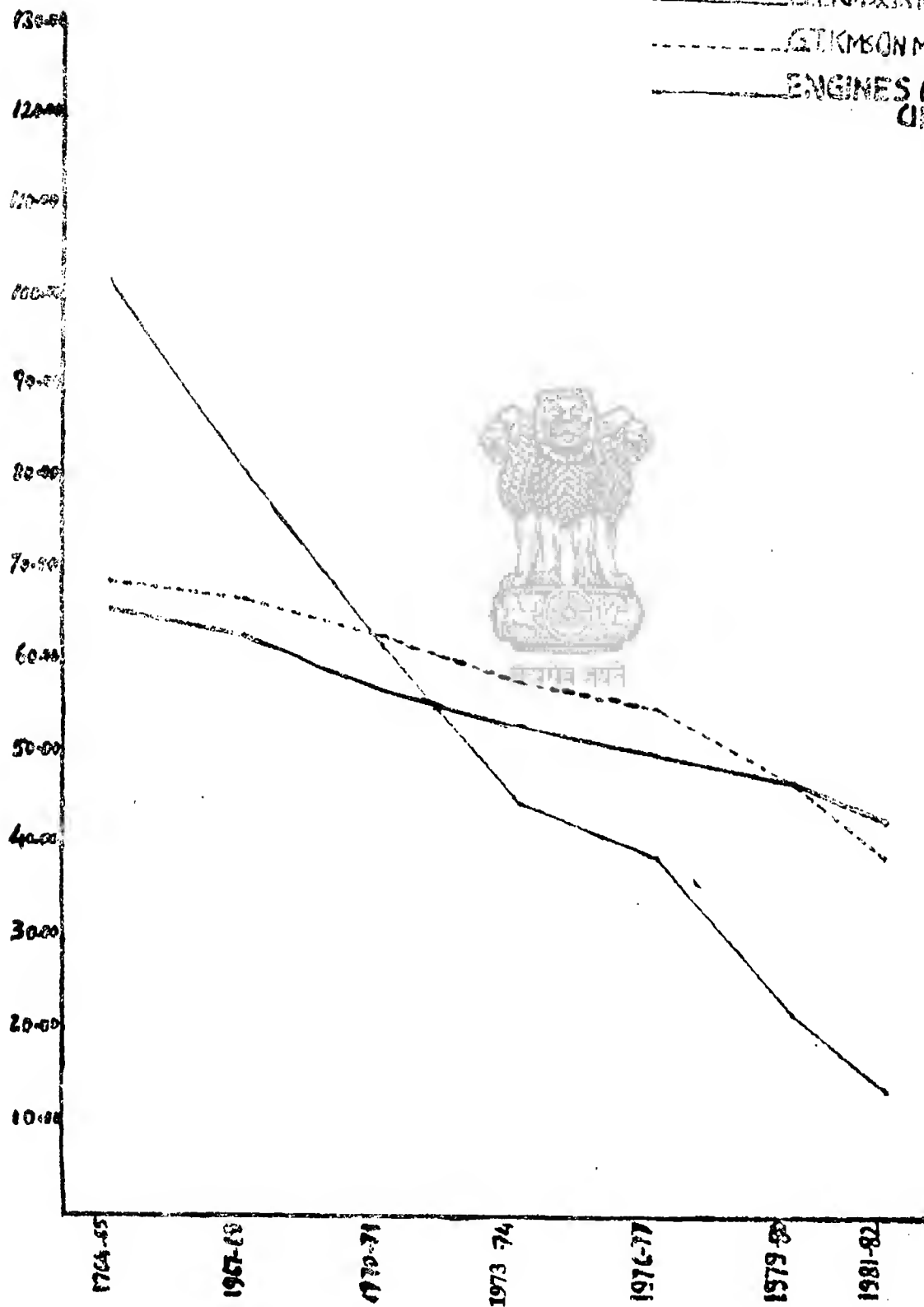
(Sample calculation of percentage reduction —  $\frac{(75.9-62.2) \times 100}{75.9} = 18$  for broad gauge passenger) (Cf. Table 3.10)



# ENGINES ON LINE VIS-A-VIS TRAFFIC HANDLED (BROAD GAUGE)

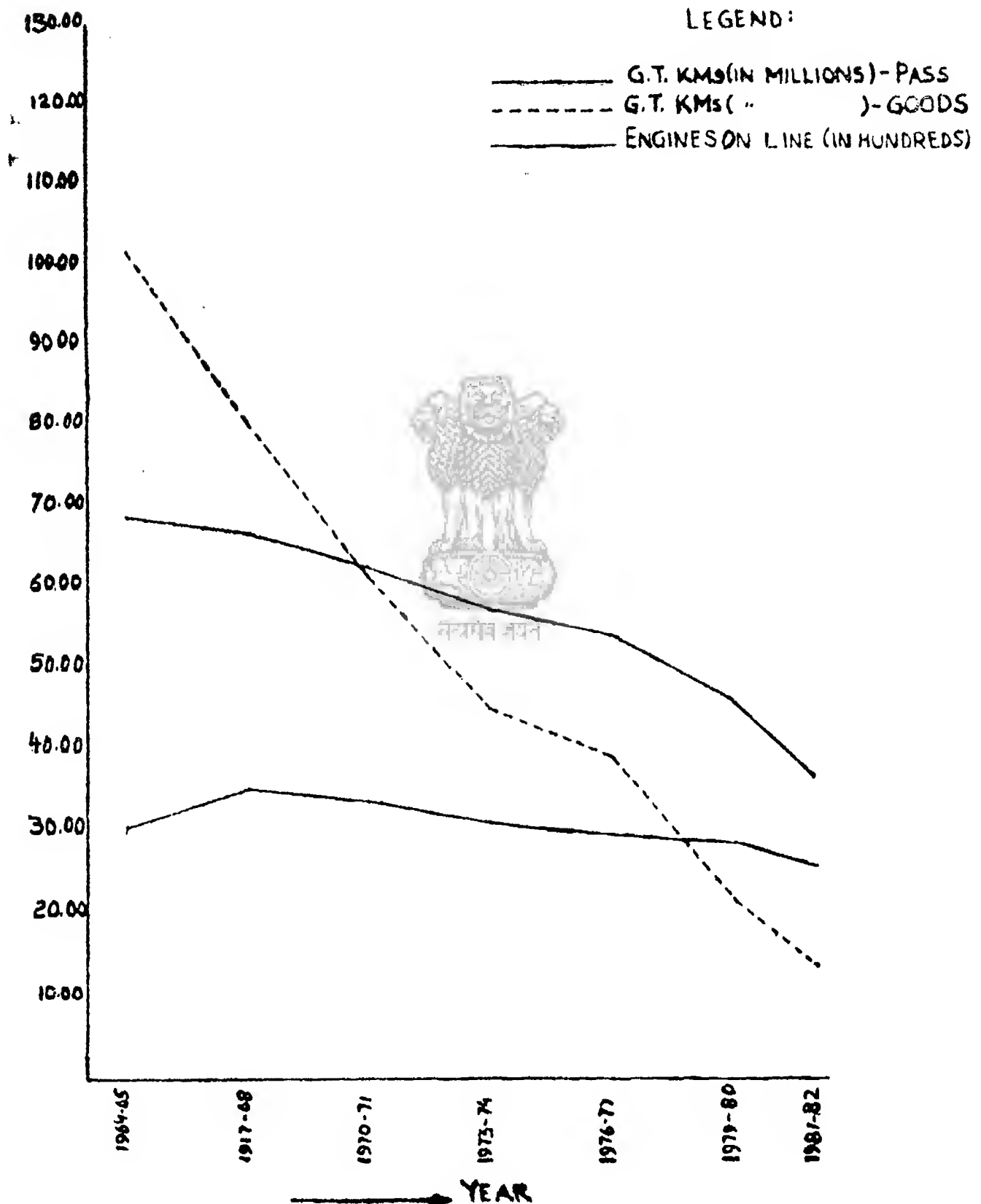
## LEGEND:

- (G.T. KMS IN MILLIONS) - GOODS
- (G.T. KMS IN MILLIONS) - PASS.
- ENGINES ON LINE  
(IN HUNDREDS)





## ENGINES 'ON LINE' vis-a-vis TRAFFIC HANDLED (METRE GAUGE)





## 17.0. Conclusion.

17.1. The Railways and Coal India Ltd. should jointly evolve a suitable bulk sampling plan so that the results of sampling check are applied to the entire supply made by the colliery. This revised sampling plan can be developed in association with Indian Statistical Institute and Indian Standard Institution.

17.2. The collieries which are supplying mostly sub-grade coal should be downgraded.

17.3. At major loading points electronic weigh-bridges should be installed to eliminate errors in weighing.

17.4. To end the evil of pilferages and thefts, the Railways should form special squads under the control of Chief Security Officer and Additional Chief Mechanical Engineer(Fuel). The squads should undertake verification of coal in the sheds/yards and identify notorious sections where the pilferages are heavy. The working of the squads should be monitored at the highest level. The network-drives recommended by us in our Report on Security should also cover coal thefts from trains on run.

17.5. The maintenance of steam locomotives is far from satisfactory. The Railways should take appropriate measures to improve the workmanship both in sheds and shops and keep the steam locomotives in good fettle. They should improve the stock position of fire bricks so that no engine runs without proper brick arches. The fire grate area of heavier engines deployed on shunting services should be reduced.

17.6. The dilution in skill and calibre of the staff managing the steam locomotives should be arrested. Where the attrition overtakes the phasing out of steam locos, and some recruitment is unavoidable the new recruits should meet the educational and skill standards specified for diesel traction.

17.7. The fuel organisation should be augmented and a time-bound programme should be laid down for proper fixation of trip ration. The implementation should be monitored at the highest zonal level.

17.8. Sample studies of selected trains on some sections of Northern and Central Railways revealed heavy pre-departure and enroute detentions. The

steam hauled trains should be planned in advance and it should be ensured that they run according to the scheduled timings. The maintenance of the locos should also be improved to instil confidence in the control staff that the steam trains would be able to cover the distance within the time allotted.

17.9. The rationalisation on work trains pilots, van and shunting goods trains conducted on Delhi Division in the late Seventies under 'Operation Kilometrage', should be seriously adopted as a strategy on the principal operating Divisions.

17.10. The Committee recommend all over Indian Railways rationalization of steam-hauled trains should be organized, keeping in mind the following :—

1. Observation of paths legislated for steam-hauled trains.
2. Optimisation of maintenance practices of steam-locomotives in sheds and workshops.
3. Proper accountal and remedial measures in respect of engine failures and time failures which are at present artificially under-stated.
4. Adoption of certain minimal improvisations on steam locomotives.

17.11. The excess number of steam locos should be withdrawn from line forthwith and condemned. The existing procedure for advanced condemnation of steam locomotives should be reviewed and a quicker method devised.

17.12. The Railways should fix annual targets of coal consumption, service-wise and shed-wise, duly taking into account the phasing out plan of steam locos and the traffic they will be called to haul.

17.13. It is not possible to precisely assess in concrete monetary terms the savings that would accrue to the system on implementation of our recommendations. Broadly, these savings would be of the order of Rs. 38 crores per year.

17.14. Fuel economy on steam traction should continue to be pursued seriously, as the annual bill of the Railways on this account is still around Rs. 200 crores.



# CHAPTER IV

## ECONOMY ON DIESEL TRACTION

### 1.0. Introduction.

1.1. The oil bill on the Railways has been going up from year to year. In 1981-82, the Railways consumed 1.2 million kilolitres of HSD oil costing Rs. 349 crores.

1.2. The consumption of oil during the last few years is given in Table 4.1 below.

Table 4.1  
H.S.D. oil consumed\*

Year	Quantity (In thousand kilolitres)	Value (Rupees in crores)
1977-78	940	123
1978-79	952	129
1979-80	980	151
1980-81	1,067	235
1981-82	1,179	349

1.3. Looking to the large oil bill, an effective expense control in this area is an important factor. It is clear to us that fuel economy has to occupy a very high place in the list of management priorities. The degree of managerial involvement and accountability will have to be raised considerably for any worth while economy to be achieved in this critical area

1.4. We have made an indepth study of the subject and have tried to identify in this chapter the vulnerabilities, the deficiencies and the failures of the system. To overcome these weaknesses, we have made certain recommendations which we believe on implementation should help the Railways to optimise their fuel consumption and to significantly reduce their oil bill.

### 2.0. Transit and handling losses.

2.1. The Railways have laid down that the transit and handling losses, (difference between the HSD oil procured and HSD oil issued to the locomotives) should not exceed 0.2 per cent of the receipts. While most of the Railways are able to work within this target, there have been periodical exceptions, sometimes glaring. Table 4.2 below indicates cases where the above limit has been exceeded.

Table 4.2  
Transit and handling losses†

Year	Railway	Receipts (In kilolitres)	Loss	Percentage Loss
1977-78	Eastern	64,024	278	0.43
	South Central	114,761	368	0.32
1978-79	Central	227,579	586	0.26
1979-80	Central	250,058	564	0.23
	Eastern	50,260	282	0.47
	North Eastern	12,613	33	0.26
1980-81	Central	257,298	703	0.27
	Southern	120,840	270	0.22
1981-82	Central	282,882	1,661	0.59
	Eastern	76,270	179	0.23
	North Eastern	15,796	84	0.53
	Southern	127,484	336	0.26

2.2. Had these Railways contained the losses within the 0.2 per cent allowance, the yearwise savings in fuel oil would have been as shown in Table 4.3 below.

Table 4.3

Year	Savings In kilolitres	In lakhs of Rupees
1977-78	289	8.2
1978-79	131	3.7
1979-80	233	6.6
1980-81	216	6.1
1981-82	1,254	35.7

2.3. We are not sure if any detailed investigations have been carried out by the zonal Railways to ascertain whether these excessive losses are due to leakages, pilferages or are casual accountal errors. We, however, find that on some of the Railways, the difference between the HSD oil procured and HSD oil issued is less than even 0.1 per cent. The percentage of transit and handling losses on these Railways is given in Table 4.4 below.

Table 4.4

Railway-wise wastage (less than 0.1 per cent) of  
H.S.D. Oil on account of handling†

Year	Railways	Percentage Loss
1977-78	North Eastern	0.07
	Northeast Frontier	0.04
	Southern	0.05
	Western	0.09
1978-79	Northern	0.03
	Northeast Frontier	0.01
	Western	0.08
1979-80	Northern	0.01
	Southern	0.04
	Western	0.09
1980-81	Eastern	0.08
	Northeast Frontier	0.05
	Western	0.09
1981-82	Northern	0.06
	Northeast Frontier	0.04
	South Eastern	0.02

2.4. The Committee also find that the overall percentage loss for the Indian Railways as a whole for the years 1977-78 to 1980-81 has been 0.10. It was only in 1981-82 that the loss was about 0.23 per cent. There is, therefore, definite scope for a downward revision of the existing limit of 0.2 per cent. Here we are not going by a mere annual average, but are also being influenced by a clear pattern over the years.

\* Annual Statistical Statement, Statement No. 27 (a).

† Source—Obtained from Railway Board.



2.5. We recommend that in the first instance, the existing limit of 0.2 percent should be reduced to 0.1 percent. We also suggest that the handling and transit losses should be watched shed/fuel-installation-wise and the Railways should investigate whether the excess is due to leakage, wastage, pilferage, inaccuracy in flow metre or calibration of tank wagons, and take appropriate remedial measures.

### 3.0. Fueling installations.

3.1. There is considerable scope for obtaining HSD oil from IOC through pipelines instead of through tank wagons. This switchover from tank wagons to pipelines is particularly feasible where there is an IOC installation in close proximity to a large permanent issuing depot. This change over would reduce the requirement of rolling stock, eliminate expenditure on terminals near the Railways' own issue points which have increasingly to be redesigned to take in full rakes and would free sectional capacity to a certain extent.

3.2. As a logical sequel to the above, the Railways should actively pursue that such fueling installations where supply is taken through pipelines should be run by the IOC themselves as a service to a bulk consumer. It has been ascertained that this arrangement is simple, feasible and economic. It would also relieve the Railways of the responsibility of account of receipts as they would be paying only for the oil issued to them and as recorded by the flow meters. This arrangement would also reduce errors creeping in because of calibration of tank wagons and would minimise the transit and handling losses. This would reduce the laboratory analysis work as chemical analysis of each tank wagon would not be necessary.

3.3. Even where it is not convenient to feed storage installations through a pipeline, there is a strong case for the involvement of IOC in keeping a constant check on the storage tanks. It is learnt that firm arrangements have not been made for de-sludging of storage tanks, internal examination for bulging, cracks etc. and re-certification of the calibration charts in accordance with storage levels. The Railways should look into this, and should organise a revised arrangement in consultation with IOC.

### 4.0. Train operations : need for improvement.

4.1. There are many aspects of diesel operation in which positive improvements can be brought about by precipitate plans of action. Some of these aspects, viz. empty haulage, detentions on route, signal lighting, fuel installations etc., have been discussed in the subsequent paragraphs.

4.2. We may also invite attention to remedial strategies already formulated by us in earlier Reports.

### 5.0. Empty running.

5.1. Table 4.5 below gives the percentage of empty wagon kilometres for diesel traction.

Table 4.5

Empty : running diesel traction

Year	Broad Gauge	Metre Gauge
1977-78	32.3	27.7
1978-79	31.1	25.6
1979-80	30.0	24.5
1980-81	30.6	27.1
1981-82	30.4	28.0

Source.—Derived from Annual Statistical Statements, Statement No. 19(a).

5.2. The specific train resistance is much less for loaded freight trains as compared to empty trains. How this resistance varies with speed for various types of services is shown in the graph at page 105. Because of the higher tractive resistance for empty trains, the consumption of fuel per 1000 GTKM would go up if the proportion of empty to loaded trains increased. From the commercial viewpoint as well it ought to be the endeavour to reduce running of empties to the extent possible.

5.3. In Part II of our Report on Transportation, we have stated\* that in the future scenario, the emphasis will shift to the running of block rake formations and setting up a system of nodal-point network where such block loads would be handled again without requiring any breakage of the load. In this pattern of movement, it is obviously not possible to altogether eliminate empty running in one direction.

5.4. Where, however, back-loading is possible, an attempt should be made ordinarily to limit empty running as much as possible not only from the view point of greater availability of the rolling stock, but also because of the effect it would have on the HSD oil consumption.

5.5. Sometimes, for finding return loads the rakes can be run to good advantage on the three sides on a triangle or on the four sides of a quadrangle. Our recommendation is, therefore, that the operational patterns should not be seen in isolation, but should also take into account the effect they would have on the oil consumption and the optimisation of the ratio between loaded to total kilometrage.

### 6.0. Heavy detentions en route.

6.1. The Committee have studied the position in respect of 13 major sections on the Northern, Central and South Central Railways. The control charts of these sections for 10 to 11 day-periods have been analysed to determine the total number of hours that the diesel engine goods trains were on road, the total detentions suffered by them as also detentions suffered by these trains for one hour or more at a stretch. The section-wise position is indicated in Table 4.6 (page 107).

\* Paras 6.3 and 19.2 of Chapter V.



# SPECIFIC TRACTIVE RESISTANCE FOR GOODS AND PASSENGER-TRAINS

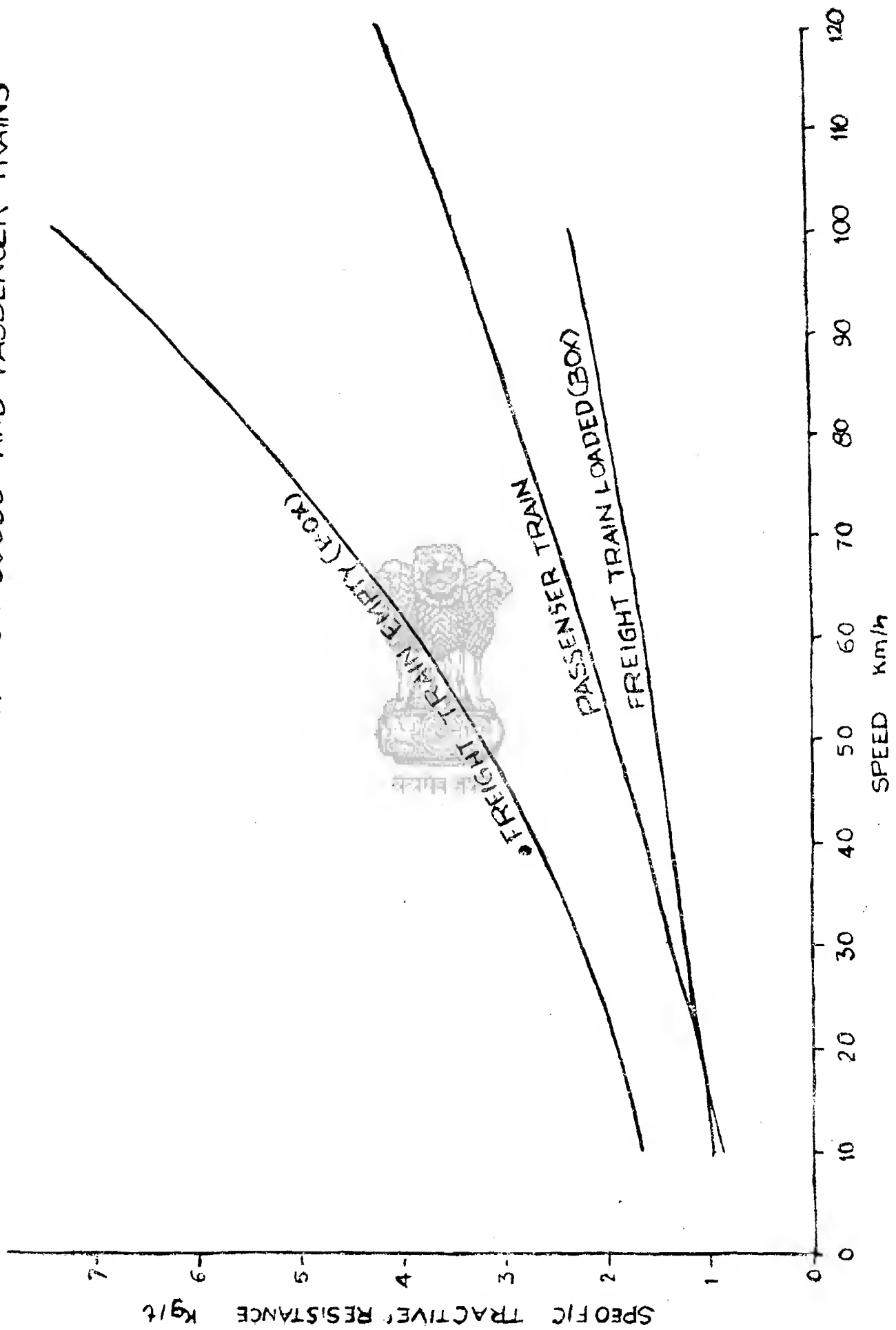




Table 4.6

## Detentions enroute

Section	Period of Study	Number of diesel goods trains run	Total hours on road	Detentions for 1 hour or more		Total detentions	
				In hours	Percentage to total hours on road	In hours	Percentage to total hours on road
1. Tughlakabad-Agra Cantt. (177 Kms.)	19-2-83 to 28-2-83	48.5	256'-42"	25'-55"	10.1	62'-54"	24.5
2. Agra Cantt.-Jhansi (215 Kms.)	"	21.7	153'-49"	22'-17"	14.5	44'-31"	28.8
3. Jhansi-Bina (153 Kms.)	"	23.6	131'-25"	19'-21"	14.7	39'-53"	30.3
4. Bina-Bhopal (138 Kms.)	"	33.2	182'-56"	24'-40"	13.5	58'-13"	31.8
5. Bhopal-Itarsi (92 Kms.)	19-2-83 to 27-2-83	17.9	83'-22"	15'-42"	18.8	30'-01"	36.0
6. Itarsi-Amla (130 Kms.)	1-2-83 to 10-2-83	12.7	94'-11"	27'-02"	28.7	44'-05"	46.8
7. Amla-Nagpur (168 Kms.)	"	7.8	71'-31"	16'-24"	22.9	30'-22"	42.5
8. Nagpur-Wardha (76 Kms.)	"	20.6	53'-48"	7'-00"	13.0	15'-25"	28.6
9. Wardha-Balharshah (136 Kms.)	"	24.9	107'-50"	13'-37"	12.7	331'-18"	29.0
10. Balharshah-Kazipet (244 Kms.)	21-3-83 to 30-3-83	40.7	249'-10"	19'-28"	7.7	62'-55"	25.2
11. Ghaziabad-Saharanpur (161 Kms.)	1-1-83 to 10-1-83	8.8	66'-08"	9'-51"	14.9	21'-18"	32.2
12. Subzimandi-Ambala Cantt. (195 Kms.)	10-2-83 to 22-2-83	12.8	79'-09"	9'-42"	12.2	22'-17"	28.1
13. Shakur Basti-Bhatinda (287 Kms.)	"	18.7	165'-33"	21'-38"	13.0	50'-16"	30.3
Total .. .. .	.. .. .		1695'-34"	232'-37"	13.7	513'-28"	30.03

6.2. We find that in the 13 major sections taken up for study, out of a total number of 1,695 hours on road, the trains were detained for 513 hours enroute. Of these, 232 hours of detentions were in respect of halts for one hour or more.

6.3. Our studies have revealed that out of the twenty-four hours available, the goods engines on an average remain on the road for 13.5 hours. The average number of BG diesel electric locos in use on goods traffic in 1981-82 was 940.\* The average number of hours that these locos would be on the road daily would thus be  $940 \times 13.5 = 12,690$  hours.

6.4. We feel that the sample sections selected by us are sufficiently large and representative of the broad gauge system, and that the results of our sample study could be applied with advantage to project detentions for one hour or more for the broad gauge system of the Indian Railways as a whole. The detentions of one hour or more suffered by all the broad gauge diesel goods trains would, in that case, work out to 1,737† hours daily.

6.5. We find that the Railways had issued certain instructions in 1974 about switching off and on of diesel locomotives. These instructions, *inter alia*, provide that on road-side stations where detention was likely to be more than 1½ hours, the control office should inform ASMs to give a written memo to the driver of the goods train intimating the expected detention of the trains at such stations. The diesel locomotives were then to be switched off and restarted only 30 minutes before the departure of the train and vacuum to be created.

6.6. Since it should not take more than 1 minute to start an engine and another 15 minutes to create the vacuum, we feel that it should be possible and desirable to switch off the engine in case the detention is expected to be more than one hour. The locomotives should be restarted half an hour before the departure of the train and vacuum created.

6.7. We have been told by many officers that in practice drivers do not switch off the locomotives whatever may be the duration of the detention. We have analysed the reasons and these generally are :

1. The control office does not inform the ASM about the expected detention even when there are serious detentions anticipated due to breaches, accidents or dislocations.
2. Some engine drivers do not have sufficient confidence that they would be able to restart the engine, or quickly enough.
3. In some engines, the batteries are weak and the engines switched off cannot be restarted.

6.8. We find no justifiable reason against switching off the engine if the anticipated duration of detention is more than one hour. This is one area where a diesel loco clearly scores over a steam loco. While it is appreciated that in some cases it may not be possible to anticipate the duration of the detention, in a large number of cases it should be relatively easy to fore see that the detention to the train would exceed one hour. In such cases

\* Source:—Annual Statistical Statements, Statement No. 22.  
12690 × 232

† —————  
1695



there should be no hesitation for the control office to pass on the message to the ASMs. The driver can send his Assistant to ASM to find out the likely duration of the detention. Once he is told that the detention is likely to exceed one hour, he must switch off the engine.

6.9. It is only then the weaknesses in the system would show up and the Railways would realise the need to avoid incidence of weak batteries and to impart diesel engine drivers the know-how to restart the engines. There may be a few cases in the beginning when the anticipations may go wrong, but these can be taken care of and overall advantages will far outweigh the difficulties created by these few instances.

6.10. The scope of savings being large, the Railways should take urgent action in the matter. Assuming that the diesel engines are switched off even for 50 per cent of the detentions of 1,737 hours, the annual saving would be 7.9 million\* litres of HSD oil, which, at per sent day prices, is worth Rs. 2.3 crores. Taking into account similar savings from metre gauge, the total savings that would accrue to the system would be of the order of Rs. 2.5 crores. In addition, it would reduce environmental pollution caused by engines remaining operative for long durations.

#### 7.0. Out of course stoppage.†

7.1. An out of course stoppage involves dissipation of kinetic energy and extra fuel is needed to accelerate the train to its original speed.

7.2. It has been estimated that for a train load of 2,20 tonnes hauled at 65 km./hour by a WDM2 locomotive, about 60 litres of extra HSD oil would be required for every out of course stoppage.

7.3. The need to avoid such stoppages is, therefore, paramount. To the maximum extent practicable, all out of course halts and stoppages should be avoided as a matter of policy.

#### 8.0. Poor lighting of signals.

8.1. Before the Sikri Accidents Enquiry Committee (May 1980) drivers had bitterly complained about the non-lighting of distant signals. Evidence was also tendered before the Committee that oil-lit signal lamps were not lit during night time and where lit, they got extinguished after some time due to a variety of reasons and generally offered poor visibility to the driver on account of non-standard wicks, non-cleaning of roundels and lenses, poor quality of kerosene oil and bad focussing.

8.2. The drivers had also brought to the notice of the Sikri Committee that distant signals are not normally taken off by cabinmen for reception of trains and in the absence of any positive indication at the distance signal, drivers have to unnecessarily restrict the speed of their trains.

8.3. Owing to the poor visibility of signals and also on account of Station Masters not being prompt in lowering them, the drivers have to first slow down and then pick up speed and in the process consume certain amount of extra fuel needed to build up the momentum of the train to its original value.

8.4. This results not only in excess consumption of fuel but also in excessive wear and tear of wheel tyres and brake blocks. We have already recommended, in Part X of our Report on Signalling and Telecommunication, that lighting of semaphore signals should be done by using photo voltaic cells where reliable power supply does not exist. Once this recommendation is implemented this problem should get settled.

#### 9.0. Temporary fuel installations.

9.1. We have come across a recurrent practice on Indian Railways for direct tank-to-locomotive fueling. No flow meters are used at these locations and measurements of the quantity supplied is done through engine gauge which are not accurate.

9.2. A test check was conducted at one such temporary fuel installation on the Northern Railway. It was found that during the period January, 1982 to June, 1983, 60,440 litres of HSD oil out of a total receipt of 25,60,840 litres (2.36 percent) could not be accounted for.

9.3. It would appear by random checks that such discrepancies are rather usual and frequent in case of such 'temporary tank-to-loco' fueling installations. These are also potential fire and accident hazards.

9.4. We recommend that the Railways should plan the operational movements in advance and take firm decisions about the locations of fuel installations. The temporary locations where such fueling has to be done should be converted into permanent fueling depots and full facilities provided including flow meters, fire fighting equipment, laboratory testing, and adequate supervision. This would also bring down detentions to tank wagons which could be used as rolling stock and eliminate their use as storage tanks.

#### 10.0. Future strategy.

10.1. We have in Part II of our Report on Transportation emphasised the need for both streamlining and rationalising rail operations not only in the realm of freight transportation but also in regard to passenger business.

10.2. In the revised pattern of movement foreseen by us under which about 85 per cent of the freight traffic should be moving in block loads, the small and intermediate yards will be by passed and can, therefore, be closed down and that in respect of a number of remaining intermediate yards, it should be possible to cut down one shift of working. These measures would appreciably reduce detentions and out of course stoppages, leading of a significant reduction in the consumption of oil.

10.3. Our recommendation that the number of short-distance stopping passenger trains should be gradually scaled down should also bring about fuel economy.

10.4. It is not known what action has been taken on the recommendations of our Report on Transportation submitted to the Government in October, 1982. In fact except for the Report on 'Railway Reserve Funds' and 'Fare and Freight Structure', implementation on the recommendations made on the other Reports (ten already submitted to the Government so far) has been rather

\*  $1737 \times 365 \times 25$  (A diesel loco consumes 25 litres per hour while idling—Authority para 6.14 of RDSO's Report No. Diesel 407/67, September 1967).

† This is a stoppage which is not provided in the time table.

‡ Chapter II, para 11.3.



lukewarm, in the absence of a whole-time machinery under a senior officer to monitor and oversee and coordinate at the level of the Railway Board and with other Ministries.

#### 11.0. Maintenance ethos.

11.1. We have extensively dealt with the subject of maintenance of rolling stock in Part V of our Report on Production and Maintenance of Rolling Stock. We have clearly brought out that there is considerable short-fall existing in the maintenance facilities both in workshops and sheds. The diesel sheds are at present holding about 20 percent more units than they have been designed for and hence tend to fall into arrears especially when there is a heavy schedule. This has a serious effect not only on reliability but proves highly expensive in terms of input costs.

11.2. We had estimated\* that if even 5 percent main line fleet of diesel locomotives is permitted to remain overdue on its annual preventive maintenance schedule, an additional 5 lakh litres of lubricating oil likely get consumed at a cost of Rs. 60 lakhs or so per annum.

11.3. We had also brought out that in financial terms, the accumulated backlog for maintenance facilities at current prices is about Rs. 500 crores and that adequate funds should be provided to wipe out these arrears.

11.4. There are also some very vital items which remain out of stock for considerable periods. The worn-out parts, therefore, continue to remain unreplaced resulting in inefficient running of locomotives. Table 4.7 below gives the position for some items for the Tughlakabad Shed on Northern Railways as a representative example :

Table 4.7

Period for which item remained out of stock

Item	Life	78-79	79-80	80-81	81-82	82-83
1. Piston ring taper face.	1 year	3 months	..	..	..	..
2. Piston ring oil scrapper.	1 year	..	..	3 months	..	..
3. Piston ring oil conformable.	1 year	11 months	10 months	6 months	3 months	..
4. Nozzles-fuel injection.	3 years	..	3 months	..	5 months	6 months

11.5. The use of old piston rings due to lack of availability of spares results in very high consumption of lubricating oil and has considerable effect on fuel consumption and thermal efficiency of the engine.

11.6. Fuel injection nozzles have remained out of stock for long durations. We are told that this item generally remains in short supply from time to time at all other sheds also because there is a single source of supply. Consequently, the worn out dribbling nozzles continue to be used causing wasteful consumption of diesel oil.

11.7. The Comptroller & Auditor General in his Report on the Railways for 1980-81 stated :

\* Para 25.5 of Chapter II.

† POH stands for periodical overhaul.

‡ Non-observing of maintenance schedules (Trip, fortnightly

"Though diesel traction was introduced in 1953-59 the creation of facilities for their repair and P.O.H.† did not always synchronise with the allotment of locomotives to Railways. Instances were noticed of detentions to locomotives in sheds 'waiting for materials' for long periods.

A review by Audit of maintenance of locomotives in 8 sheds (Itarsi, Howrah-Burdwan, Mughalsarai, Tughlakabad, Erode, Bondamunda, Waltair and Ratlam) and 3 Workshops (Parel, Charbagh and Kharagpur) showed that (i) the percentage of ineffective locomotives (i.e., not fit for use), (ii) the number of engine failures on account of mechanical defects, mismanagement by crew, etc. and (iii) delays in carrying out the maintenance schedules had increased. One of the reasons for the high incidence of engine failures was non-observance of maintenance schedules such as trip schedules, ‡ monthly, quarterly and yearly schedules and P.O.H.

Cases were also noticed of engines failing within a short interval after P.O.H. due to bad workmanship, use of defective parts, etc.. Of the 86 engine failures analysed by Audit during 1978-79 to 1980-81 in Tughlakabad (41), Waltair (22), Bondamunda (17) and Ratlam (6) sheds, 13 failures had occurred within one month of P.O.H., another 16 in 2 months, 12 in 3 months and 7 within 6 months. An average of 5 days per locomotive was taken by the South Eastern Railway to repair the failed locomotives and to put them back to traffic".

1.8. We have found that the quality of maintenance of diesel locos is not showing an upward swing. The number of accidents attributed to diesel loco failures is increasing.@ The position is given in Table 4.8.

Table 4.8

Locomotives failures : diesel

Year	Broad gauge		Metre gauge	
	Number of failures	Engine kms. per engine failure (in thousands)	Number of failures	Engine kms. per engine failure (in thousands)
1976-77	1,473	103	572	74
1977-78	1,876	86	198	218
1978-79	1,760	93	297	148
1979-80	1,994	91	241	189
1980-81	1,920	100	307	270
1981-82	2,590	81	652	81

11.9. We cannot help observing that there is a poor maintenance ethos on the Railways. This is because of mismanagement and bad planning of the past when the Railways continued to inject more and more locomotives in the system without providing commensurate maintenance facilities. Besides, they have not improved the

and monthly) is mainly due to the locomotive not being returned to its base shed in time.

@ Engine Kilometres per engine failure is, however, fluctuating



supply position of vital fast-moving stores. The Railways should have ensured that such items like piston rings, gaskets, fuel injection nozzles always remained in stock. Where ever necessary, they should have developed multiple sources of supply. The poor maintenance of locomotives leads to wasteful consumption of oil and imposes heavy penalties on the system by way of sub-optimal use of these assets and, what is even worse, a number of resultant accidents cause all round damage to the system.

## 12.0. Poor driving practices.

12.1. *Acceleration Control Device.*—We are told that Acceleration Control Device (ACD), has been disconnected (or not working, if connected) from the circuit in most of the locomotives. This has been done on the mistaken belief that this device results in reduction of hauling power well as in a general slowing down of trains. We were also told that the device does not work efficiently due to poor quality of the rubber diaphragm which is the most vital component of the equipment. Once this device is put out of commission, control is lost over matched combustion and it is possible to inject fuel that the engine cannot burn. This leads to wastage of HSD oil. Similar wastage occurs in the load box test.

12.2. We recommend that ACDs are kept in proper working order. Drivers and maintenance staff should be educated on the importance of the component in the regulation of fuel consumption. They should be taught to wait for sufficient time at each notch till the booster pressure stabilises before they step on to the next notch thereby avoiding the pumping of excess fuel into the combustion chamber resulting in wastage of fuel. As a more practical answer, control over fuel build-up should be a part of the engine governing system instead of through an external device which only sets a limit but not intermediate calibration.

12.3. We find that such a recommendation was also made by the Petroleum Conservation Research Association (PCRA)\*, a Government sponsored body. The recommendation in our opinion is very fruitful and should be implemented forthwith. It ought to make a positive dent in the oil bill.

## 13.0. Track standards and fuel consumption.

13.1. *Poor health of track.*—We have repeatedly drawn the attention of the Government to the accumulation of heavy arrears of track renewal which is responsible for an increasing penalty in speed, safety and efficiency. There are vast stretches of track where the rails and sleepers are overdue replacement and the ballast cushion is much less than the prescribed standard. This results in poor maintenance of track. The poor maintenance of track has an effect on train resistance and consequently on fuel consumption.

13.2. In Part IV of our Report on Railway Reserve Funds, we have already indicated† the level at which the Railways should appropriate money to DRF and overtake the arrears of track renewal.‡ We have also recommended that urgent action should be taken by the Railways to increase the depth of ballast cushion and mecha-

nise maintenance of track on important routes. These measures would, *inter-alia*, bring down the train resistance and the fuel consumption.

13.3. *Speed Restrictions.*—We have stated@ in Part VI of our Report on Railway Track, Bridges and Lands that by 31 March 1982, 2,295 kilometres of track was under speed restrictions. Speed restrictions have a very deleterious effect on operation, by slowing it down and thereby reducing the usage of rolling stock and increasing the wasteful consumption of fuel. The driver has to reduce the speed of the train whereby the kinetic energy of the train gets dissipated and extra fuel is needed to accelerate the train back to its original speed.

13.4. We find that no scientific studies have been conducted to relate the speed restrictions to the condition of track and the rolling stock. The magnitude of speed restrictions imposed are presently based more on a subjective assessment of track conditions rather than on a scientific correlation with the percentages wear of the rail surface, percentage of unserviceable sleepers, depth of ballast cushion, soil condition, type of rolling stock used.

13.5. We recommend that such a study should be carried out by RDSO and precise guidelines consistent with safety should be prescribed. The magnitude of speed restriction to be imposed should be within the framework of these guidelines.

13.6. We are also told that there are cases where Station Master keeps on issuing caution orders to the drivers long after the work required to remove the speed restriction has been completed. This is because the Permanent Way Inspector does not inform Station Master or Control office about the lifting of speed restriction. We recommend that the existing system should be reviewed to avoid such communication gaps which are frequent.

13.7. *Welding of track.*—We find that a study§ was conducted by RDSO to assess the extent of reduction in fuel consumption due to welding of rails. The test track consisted of fish-plated, 3-panel welded, 5-panel welded and continuously welded rails, and the freight train consisted of loaded four-wheeler wagons hauled by a WDM-2 locomotive.

13.8. The trials revealed that in the speed range of 20 to 60 kms./hour the specific rolling stock resistance of a WDM-2 locomotive reduced by above 11.7 percent on continuously welded track as compared to that on fish-plated track. The reduction of fuel consumption of the WDM-2 locomotive working in the speed range of 40-60 kms. per hour was 2.2 percent, 5.9 percent and 8.9 percent in the case of 3-panel welded, 5-panel welded and continuously welded tracks respectively as compared with that on fish-plated track.

13.9. By 31 March, 1982 long welded/continuous welded rails were provided on 8,582 km. of rail track but no information is available in the Railways indicating the extent to which the fuel has been saved nor has any methodology been developed on this. No systematic trial or use of the trial-results have apparently been attempted by the Railways. This is unfortunate.

\* PCRA is a registered society promoted by the Ministry of Petroleum, Government of India, to plan, coordinate and implement all activities connected with conservation of petroleum products.

† The Railways have substantially implemented the recommendations made by us in this regard.

‡ In the budget for 1983-84 the Railways have now appropriated Rs. 850 crores to DRF and we learn that they are pursuing with the Ministry of Finance for an additional appropriation of Rs. 260 crores from General Finance.

@ Para 12.0, of Chapter I.

§ Mechanical Engineering Report No. M-332, September, 1975.



13.10. We have in this regard already recommended in Part III of our Report\* on Railway Track, Bridges and Lands that the progress of welding should be accelerated and that the aim should be that by 2000 AD, 30,000 kms. of broad gauge and 3,000 kms. of metre gauge routes having high-density traffic should be provided with LWR/CWR. Remaining track kilometreage should also be provided with short welded panels in the near future. Welding of rails in major classification yards should also be completed by the Seventh Plan. The scope of saving of HSD oil being considerable, the Railway should implement this recommendation on a high-priority.

13.11. *Weight of rails section.* The weight of the rail per unit length affects the deflection of rail track. The greater the deflection the greater is the amount of energy absorbed by the track. This energy loss results in increased rolling resistance and higher fuel consumption.

13.12. RDSO had conducted trials† with a WDM-4 locomotive both on 90 R\*\* rails and 52 kgs. rails.\*\* Different speeds were chosen for conducting tests in the speed range of 40 to 75 kms./hour on both types of track. The tests revealed reduction in consumption of fuel per thousand GTKM from 0.26 to 8.41 per cent on 52 kg. rails as compared to 90 R rails. Table 4.9 gives the percentage savings for various speeds as compared to 90 R rails.

13.13. The existing BG track standards do not permit the use of 52 kg. rails on Group D routes (speeds upto 100 kms. per hour) where traffic density is less than

Table 4.9

Percentage reduction in fuel consumption  
per 1000 gross tonne kilometres

Speed km./h.

40	0.26
50	2.31
60	4.39
70	6.31
75	8.41

10 gross million tonnes per year and on Group B routes (speeds below 100 kms. per hour). We have, however, emphasised in Part III of our Report on Railway Track, Bridges and Lands that with heavy track structure, permanent way requires less maintenance and need renewal at longer intervals. We have already recommended†† that even on Group D and E routes the primary renewal should be done with rails of 52 kgs./m. section. The use of higher poundage of rail would as per the above study result in considerable reduction in fuel consumption.

#### 14.0. Design Charges.

14.1. *Updating and uprating.*—The Railways have been manufacturing diesel-electric locos for the last twenty years but during this period there has been no significant change in their design and specifications. The original design and specifications as procured from ALCO in 1962 are by and large being continued.

14.2. All over the world, considerable research has been directed towards updating and uprating of fuel engines. Many achievements have been made by various diesel engine manufactures in increasing the efficiency of engines and reducing the rate of fuel consumption. The Indian Railways have thus lagged behind these advanced countries by almost two decades, as their production units have not been forward-looking and the product of these units has been virtually static in technology. Neither DLW nor RDSO have helped in this regard, nor have the Railway Board exerted any catalytic influence.

14.3. If the Railways with limited resources available have to meet the challenges of the future, they have no option but to narrow and close this technological gap. It is for this reason that we have recommended in Part V of our Reports on Production and Maintenance of Rolling Stock that the production units should be provided with developmental infrastructure to improve component design, layout engineering experimentation with alternative materials etc.

14.4. We have also recommended‡ in Part VIII of our Report on Research and Development that a Research Centre for diesel traction should be set up for optimisation of existing designs for diesel engines for increasing their efficiency and reducing fuel consumption and taking up development of new designs of high horse power diesel locomotives.

14.5. We are told that ALCO have offered a 'fuel efficiency kit' which when fitted to the existing diesel engine being manufactured in DLW would result in reduction in consumption of diesel and lube oils and at the same time improve the life-expectancy of the hot components. @ ALCO claim that their 'fuel efficiency kit' would result in per cent saving in diesel oil and 50 percent in lube oil. The Railways have estimated that even with 5 per cent saving in diesel oil and 25 percent saving in lube oil, they would be able to annually save about Rs. 19 crores on their oil bill. We learn that this proposal is under consideration of the Railway Board.

14.6. An efficient and economic diesel engine being the paramount need of the day, we recommend that the Railways should take immediate action to step up the fuel efficiency of the diesel engine by incorporating necessary changes in the design and specifications of the components.

14.7. We recommend that the Railways should carry out a global survey of the family of fuel-efficient locomotives being used by different Railways abroad and come to a decision whether they should stick to ALCO engines or shift to some other more efficient fuel engine. We learn that such a survey is being carried out by RDSO who would no doubt take into account the experience of other Railways about the performance reliability of different types of engines used by them. They should also test the claims of various designers with reference to the conditions prevalent in our country. Before a final decision is taken the Railways should also study seriously whether the design modifications to improve the efficiency of the internal combustion engine can be done indigenously.

\* Cf. Paragraph 17.0\* of Chapter I.

† Mechanical Engineering Report No. M-357.

\*\* 90 R refers to 90 lbs per yard.  
52 kgs. refers to 52 kgs. per meter.

†† Para 6.1, of Chapter I.

§ Para 16.0 (Chapter IV).

‡ Para 7.0 (Chapter VII).

@ These engine valves, turbo charger, turbine discs, blades, cylinder head etc.



14.8. If necessary, the Railways should import the latest technology. We have in this regard already stated\* in Part VIII of our Report on Research and Development that there should be no hesitation in importing the latest technology in the areas where we lack it. This is an area with great oil saving potential and should no longer be ignored.

14.9. *Derating of fuel injection pumps.*—We find that the Petroleum Conservation Action Group (PCAG)† had conducted some experiments@ on derating of fuel injection pumps (the fuel injection pump output was reduced at full load from 351 to 310 cc). When the locos with derated pumps were tested on the load-box, there was almost no change in the booster pressure. No complaints were also received about loss of hauling power or increase in the running time between sections both on goods and mail services.

14.10. After being fitted with derated fuel injection pumps, the rate of consumption of oil for a locomotive in Itarsi loco shed fell from 6.3 litres of oil per kilometre to 4.5 litres of oil per kilometre. PCAG had concluded. "There is scope for bringing about considerable fuel economy by reducing the full load output of the fuel injection pumps. However, extensive trials on different locomotives will have to be conducted to actually quantify the fuel economy that can accrue by derating Fuel Injection Pumps."

14.11. We find that some engineers feel that no fuel economy is possible by derating the fuel injection pumps. This together with the other recommendations made by PCAG should clearly be subjected to extensive studies and trials in order to explore areas of possible fuel economy, particularly in view of the Itarsi experiment. It does not appear correct to brush aside well-considered recommendations of an expert group without giving it the benefit of extensive trials in the field.

14.12. *Vehicle weight reduction.*—There is substantial scope for economy in oil consumption by reduction of vehicle weight. We find that some Railways abroad have made considerable progress in introducing light weight aluminium alloy or stainless steel coaches with seat panelling, partitions and furnishing made of light weight materials.

14.13. The specifications prepared for coaches to be manufactured at the proposed new coach factory aim at reducing the axle load by three tonnes. This is encouraging, but the proposal for the second coach factory is still in an infant stage and, therefore, not much benefit can be realised over the next few years. It is, therefore, important that the existing coaches manufactured by ICF are also given the benefit of design developments aimed at reductions in weight, independent of what design specifications are adopted by the new coach factory.

14.14. We note that instead of a reduction in the weight of an ICF coach it has over the years actually gone up by 2.8 tonnes over that estimated by the collaborators. A number of changes have been made

necessitating unavoidable weight increases. On the other hand, not much has been done to reduce the weight wherever possible apart from some marginal changes in the brake rigging. It is learnt that some reduction is expected by changing over to corten steel and to air brakes as well as by the increased use of fibre glass plastics in windows. The maximum scope exists in changing the existing oxichloride flooring to 'vinyl tile floor'. Not much progress, however, seems to have been made. This should be vigorously pursued. Coaches of reduced weight should be taken up for production, certainly in the second coach factory but also in ICF.

14.15. *Wagons : design changes.*—A new type of box wagon (BOX N) with higher sides and reduced length has been designed so that the length of the train is reduced and a goods train consisting of 55 such wagons can be accommodated within the existing loop length. We understand that the final decision on the marked carrying capacity of the BOX N wagon has still not been taken by the Railways. This should be expedited.† It is expected that the ratio of payload to tare weight of this wagon would be more when compared to the corresponding box wagon now in the system in which case the fuel consumption would go down.

14.16. In part V of our Report on Production and Maintenance of Rolling Stock we have recommended‡‡ advance condemnation of 4-wheeler wagons by reducing the codal life from the present 35 years to 30 years. This course of action has been suggested by us to do away with wagons of old designs with plain bearings. These wagons will get replaced by those with roller bearings. The starting resistance†† for wagons with roller bearings being much less than that for wagon with plain bearings. This would automatically lead to savings in oil consumption.

#### 15.0. Shed Consumption.

15.1. *HSD oil.*—One area of economy in the use of HSD oil which offers itself for quick control is its consumption during maintenance schedules in the homing sheds. Accurate information could not be made available to us regarding the total quantity consumed. According to certain sample studies, each BG main line diesel locomotive shed homing 100 locomotives consumes between 70,000 to 90,000 litres of HSD oil every month during maintenance and testing.

15.2. The shed consumption of HSD oil will depend considerably on the time an engine is kept running during maintenance, the extent to which locomotives are used inside the sheds for shunting purposes, the number of hours kept on load box etc.

15.3. It is understood that no norms or guidelines have so far been laid down in this regard. We recommend that this work should be taken in hand and should form an important component of the revised and updated layouts and procedures that we had earlier recommended\*\* in Part V of our Report.

\* Para 1.6, of Chapter VII.

† This was later changed to Petroleum Conservation Research Association.

@ These were at Itarsi loco shed (18, August 1977 to 6, October 1977).

‡ Also Cf. paras 12.2.2 13.5 of Chapter II and para 8.4 of Chapter VIII of Part II of our Report on

Transportation.

‡‡ Para 11.9 (of Chapter III).

†† The starting resistance for all types of rolling stock can be taken as 9 kgs. per tonne for plain bearings and 6 kgs. per tonne for roller bearings (Para 5.4 of RDSO's Report No. Diescl/407/67).

\*\* Paras 5.2 and 5.5 of Chapter III.



15.4. As a rough estimate the total shed consumption of HSD oil on the Indian Railways would be of the order of 15 million litres per year and a saving of 10 per cent through a scientific study of shed procedure would not be over optimistic. This could result in a saving of about Rs. 50 lakhs annually.

15.5. *Lube oil*.—ALCO had indicated that the lubricating oil consumption for WDM2 diesel-electric locomotives should vary from 0.8 to 1.2 per cent of the fuel oil consumption. The test undertaken on one newly built diesel engine at DLW indicated lubricating oil consumption of about 1.32 per cent. Tests on more engines to get the representative value could not be undertaken for want of test bed capacity at DLW†.

15.6. The Railway Board laid down the following targets for lubricating oil consumption (as a percentage of fuel oil consumption) for the various classes of locomotives :—

Category	Percentage
WDM1/WDM2	1.5
YDM4	1.3
WDM4	1.1
YDM3/YDM5	1.0

However, the Railways have, by and large, not been able to work to these targets and have been consuming lubricating oil much in excess of the permissible limits.

15.7. The position of consumption of lube oil by WDM2 locomotives homed at different sheds is given in Table 4.10 below:—

Table 4.10

Percentage of lube oil to diesel oil consumed by WDM 2 locomotives

	1978-79	1979-80	1980-81
Itarsi	2.00	1.79	1.80
Tughlakabad	0.96*	2.18	2.19
Erode	1.60	1.48	1.68
Bondamunda	1.92	2.50	2.40
Waltair	1.86	1.85	1.99
Ratlam	—	2.67	2.31

Source.—Page 60 of the Advance Report of the Comptroller and Auditor General for the year 1980-81.

15.8. We find that except for Erode Shed in 1979-80, the consumption of lubricating oil has always been higher than the designer's (ALCO) anticipations and also higher than the upper limits laid down by the Railway Board.

15.9. The reasons attributed by the Railways for this excess consumption are :—

1. External loss at the time of dispensing and leakages from pipeline during the run,
2. Difficulty in keeping proper account of lubricating oil due to topping up at outstation depots.

3. Use of old piston rings due to lack of availability of spares.

4. Worn out cylinder liners.

15.10. We have already dealt with‡ the effect of the use of worn out items on the consumption of HSD and lubricating oil and have suggested that the Railways should ensure that at no time these items are in short supply and wherever needed more sources of supply are developed.

15.11. As for the supply of lubricating oil at outstation depots, the number of points where lubricating oil is issued have proliferated over the years. For instance, on Delhi Division there were at one time more than ten points (other than the shed homing diesel locos) where lubricating oil was issued. Although this number has since been somewhat reduced, we find no justification in issuing lube oil from points other than the sheds. The oil sump capacity of a diesel locomotive is adequate to carry it from one maintenance schedule to the next. Lubricating oil issued from small unsupervised station points cannot but lead to leakages, misuse and accountal difficulties. This could be one of the reasons why the Railways have not been able to work to the target figure of 1.5 per cent laid down by the RDSO.

15.12. To restrict the issue of lube oil we recommend that the lube oil dipstick on the locomotives be calibrated to show exact readings instead of merely giving indications of 'high' and 'low' marks. The shed staff would then clearly know what quantity of lube oil is there in the engine and what further quantity is required.

15.13. We were surprised to find that the test undertaken to determine the lubricating oil consumption was performed only on one newly built diesel engine at DLW and that too over a half-hour period. Tests should have been undertaken on a larger number of engines particularly when the lube oil consumption during the test trial was coming to 1.32 percent as against the designer's anticipation of 0.8 to 1.2 per cent. We recommend that such tests should be undertaken on about 10 per cent of the diesel engines with a view to precisely determine what should be the specific fuel and lube oil consumptions.

15.14. We would like to reiterate the need for additional R & D effort to reduce the lubricating oil consumption by controlling the clearance between the piston and cylinder liners and adopting different designs of ringpack.

#### 16.0. Oil thefts.

16.1. HSD and lubricating oils are both costly items. In the present socio-economic conditions there may always be a tendency to pilfer these commodities. We learn that the Railway Board have issued instructions that the fuel tank strainers should be sealed to prevent siphoning out of oil from the locomotive tank. We doubt if these instructions are being faithfully implemented.

16.2. Another way to pilfer the HSD oil could be by opening a pipe joint. We recommend that one study about the design, the lay out and the configuration of the pipelines should be carried out and steps taken to avoid oil being taken out through the pipe joint.

† Please also see para 17 later.

\* This seems to be a typographical error in the CAG's Report. At no time the consumption in Tughlakabad has gone down

to this extent.

‡ Cf. Paragraphs 11.4 to 11.6 of this Chapter.



16.3. We further recommend that the number installations (other than sheds), from where HSD oil is issued, should be minimised and such locations should be manned by only Assistant Mechanical Engineers. This is more extensively dealt with in paragraph 19 later.

#### 17.0. Testing facilities.

17.1. The test bed facilities available in DLW are antiquated and need to be modernised urgently to accurately measure the 'specific fuel', and lube oil consumption of the engines manufactured by them. It would only then be possible for the Railways to know whether the engines which are being turned out by the Production Unit have been built according to proper design and specification and would facilitate them to know whether some components have to be changed because of poor quality or bad design.

17.2. Similar facilities should be developed in the POH shops, and in course of time in the sheds to know the specific fuel consumption of the engines while in service and compare the same with the laid down standard specific fuel consumption. Such a comparison would indicate the health of the engine and the extent of leakages, and enable the Railways to adopt corrective strategies.

#### 18.0. Control mechanism.

18.1. Any efficient control mechanism for fuel management should have the following characteristics :

1. A norm should be fixed for fuel to be consumed per unit traffic output.
2. The actual issue of oil to be monitored vis-a-vis the norm fixed.
3. An analytical study to be carried out to determine the cause for deviation from the norm and taking remedial and corrective action.

18.2. The norm to be fixed should be such as would enable the management to evaluate and critically review the consumption of fuel oil-a-vis the traffic handled. It is through such a norm that an adequate link between the financial outlay and the physical target can be established.

18.3. The rate of consumption of diesel oil per thousand Gross Tonne Kilometres is considered a good norm in this case. But this index is influenced by several factors such as the efficiency of the diesel engine, the state of maintenance of rolling stock and the track,

the skill of the locomotive crew, the trailing load and the curves and gradients of the section. Its value will, therefore, not be uniform all over the Railways, but would vary from section to section and train to train and, therefore, there is need to fix the rate of consumption for each trip.

18.4. We find that the zonal railways have been asked by the Railway Board to fix trip rations. These trip rations are to be fixed by actual field trials by the Fuel/Loco Inspectors who also have to make prompt investigations at the end of each trip for excess consumption over the trip ration which should be followed by immediate appropriate corrective action. A certain percentage of the trip rations fixed by the subordinate staff have to be test-checked by mechanical engineers by actual field trials.

18.5. The Comptroller & Auditor General, in his Advance Report for the year 1980-81, inter-alia, brought out that on the Eastern Railway, trip rations of diesel oil had not been fixed at all. Similarly, on the Northern Railway, trip rations had not been fixed in respect of various sections served by WDM2 locomotives homed in Tughlakabad shed. The Report further brought out that the trip rations fixed in 1972 for the Broad Gauge sections of the Western Railway were still operative and had not been revised despite changed operational conditions such as removal of speed restrictions etc. The Report also spotlighted cases where consumption of diesel oil exceeded the trip rations.

18.6. We are told that even now the trip rations for every trip have not been fixed scientifically by the Zonal Railways. By and large, no test checks have been carried out by the mechanical engineers. In the absence of suitable norms, the control mechanism cannot be said to be effective or reliable.

18.7. We find that RDSO had conducted a study on the theoretical determination of fuel consumption of diesel locomotives.† In this study, RDSO had outlined a method to calculate the fuel consumption from basic tractive effort and rolling resistance curves and had suggested that the trip rations worked out on the basis of theoretical calculations should be cross checked by practical trials, and if the difference between the two figures is large, there would be a need to review the conditions under which the trials were conducted.

18.8. RDSO had also evolved a theoretical formula‡ from the one used by the Russian Railways. The value of various co-efficients used in the formula have to be determined, keeping in view the type of locomotive, rolling stock and the multiplicity of operating conditions such as track profile, temperature and altitude conditions.

\* Specific fuel consumption is kilograms of HSD oil used per horse power hour.

† Miscellaneous Report No. Diesel 407/67 (September, 1967)

‡  $Q = Q_0 (K_1 + K_2 + K_3 + K_4 + K_5 + K_6) + Q_i$

where,

$Q$  = the fuel consumption for the given locomotive and section expressed in litres/1000 GTKM@

$Q_0$  = the specific consumption of fuel in litres/1000 GTKM, if the track is perfectly level and straight between the two terminal points of the section and the rolling stock used is of a specified standard type ;

$K_w$  = a co-efficient taking into account the influence of the variation in the type of rolling stock, from the

standard one presumed for  $Q_0$  ;

$K_1$  = a co-efficient taking into consideration the influence of curves and grades ;

$K_2$  = a co-efficient taking into consideration the influence of the ambient atmospheric conditions ;

$K_3$  = a factor taking into account the skill of the locomotive crew ;

$K_4$  = a co-efficient taking into account the influence of braking ;

$Q_i$  = the fuel consumption for idling.

RDSO's study No. 407/67 (September, 1967).

@ GTKM stands for Gross Tonne Kilometre.



The use of this formula has not so far been made, as the various co-efficients are not available for the conditions on the Indian Railways.\*

18.9. We learn that it is not the practice on the Zonal Railways to determine fuel consumption on the basis of theoretical calculations, and that the existing fuel organisation is weak and does not receive adequate top level support. It seems to us that not much concern has been displayed in linking physical performance with financial expenditure. The concern of the administration is on physical performance side and not on the inter-related cost.

18.10. The present system of control mechanism for fuel management does not work efficiently. The trip rations have not been fixed scientifically for all the trips. The existing infrastructure is weak and in its present set up cannot deliver the goods. To put the control mechanism on a sound footing, we make the following recommendations :—

#### 19.0. Organisational Changes.

19.1. The Administrative Reforms Commission in their Report on the Railways in November, 1968 had *inter alia* recommended that every oil depot which supplies oil to diesel engines outside the loco-sheds should be placed under the charge of an Assistant Officer or at least a senior inspector, whose duty it should be to take every possible step to ensure that there was no leakage.

19.2. The Study Group on Economy in Energy Consumption April, 1980 also recommended that massive input in terms of more officers and inspectors would be essential, if the objective of achieving efficient use of fuel is to be realised.

19.3. We are generally in agreement with these two Expert Committees. The present set-up of fuel control organisation needs to be strengthened. In specific terms we would suggest that :—

1. The fuel organisation on the Zonal Railway should be headed by a senior officer to be assisted by a suitable number of officers and fuel inspectors.
2. At the Divisional level, one senior scale mechanical engineer along with necessary complement of fuel inspectors should be exclusively deployed to fix trip rations and to exercise control over fuel consumption. Each major fueling point should in addition be manned by an Assistant Mechanical Engineer (AME).
3. At the shed level, there should be one AME earmarked for control over the use of HSD oil and lubricating oil. We have in this regard already brought out in Part V of our Report that the fueling installations attached to the sheds do not have any management supervision† and that the management structure should be strengthened to cover direct supervision of cost intensive activities such as fuel installations.
4. We have also brought out that there has been a tendency to increase the number of locomotives

homed, but the system has not moved towards a rational division of management functions.

5. It should be generally possible through rational division of functions to post an AME in the shed exclusively for fuel control without creating additional posts.

19.4. While making these recommendations, we have been aware that the Railways had earlier tried out an experiment of posting one AME each at three diesel sheds (Itarsi, Katni and Waltair) exclusively for fuel control. These AMEs conducted periodical trials on various sections, monitored locomotives showing high fuel consumption, investigated all field problems in respect of fuel oil consumption and supervised the schedule of maintenance, resulting in substantial economies and that for all the three sheds put together the Savings were found to be of the order of Rs. 10 to 11 lakhs per month or about Rs. 1.2 crores per year.

#### 20.0. Trip ration.

20.1. Once the fuel organisation is strengthened it will be easier for the Railways to fix trip rations for each train and each section scientifically. The trip rations fixed should also be test checked by mechanical engineers by actual field trials.

20.2. While, it is true that theoretical methods cannot supersede the system of trip rations based on actual field trials, such methods do assist in a rational assessment of the anticipated fuel consumption. We, therefore, recommend that RDSO should evolve a theoretical formula and that the trip rations fixed by actual trials are compared with the consumption determined as per the theoretical formula and if the difference is large, the same should be investigated.

20.3. At present diesel locos have no fixed territory : they move all over without any regard of the sheds homing them. In this system, a diesel loco returns to the shed after about a week during which it is handled by about 20 drivers. It is sometimes argued that in such a case, only engine-wise and not trip-wise statistics can be maintained about the consumption of fuel. We do not subscribe to this view. Even in the integrated system of working of diesel locos, engine crews are employed trip-wise and accordingly there should be no difficulty in fixing trip rations and comparing the actual consumption of oil with the trip rations.

20.4. We understand that very often there is a dispute about the quantity of fuel in the locomotive handed over by one driver and taken over by another. This is because every unit division on the glos (which are used to measure the quantity of fuel left in the diesel tank) is equal to 50 litres of oil and thus there can easily be an error of upto 25 litres. To overcome this and also to accurately assess the quantity of fuel oil consumed after every trip, we recommend that a suitable flow meter should be devised and fixed at an appropriate place‡ in the diesel loco to indicate the fuel oil consumed during the trip.

20.5. The reasons for any significant variation between the actual use of oil *vis-a-vis* the norm fixed should be analysed in detail. The habit of giving general

\*In fact there is too extensive and use of the principles of *ceteris paribus*, and too many variables have been simplified by presumptions in the RDSO formula. The formula itself need to be revised after a thorough study of the variable; otherwise this will be of no practical use.

†Para 8.0, of Chapter III.

‡One such place has been indicated in RDSO Study No. Diesel 407/67, September 1967.



remarks, always trying to justify the excess should be given up and yield place to an anxiety and a concern to ascertain the real cause or causes for the excess. The reasons for the variation together with the corrective strategies to be adopted for cutting down the fuel consumption should every month be put up to the top echelons of the management including the General Manager, this being necessary to prevent wastage or leakages in this costly and scarce item.

20.6. We further recommend† that sheds should make fuel consumption analyses that are not only locomotive wise but also driver and section wise. Component history especially where they relate to fuel and lubricant efficiency should be carefully compiled. For this purpose, it is essential to instal micro processors in the sheds.

20.7. The Fuel Cells in the sheds should also select a few locomotives and monitor them continuously during service to identify factors adversely affecting the engine performance. During the course of this monitoring the Railways would be in a position to know whether during the run, pilferage is going on and whether it is necessary to change the design and lay out of pipes etc., to avoid such thefts.

20.8. The Committee further recommend that there should be energy conservation cells opened in RDSO which should inter alia, be assigned the task of studying and comparing the performance of locomotives homed at few sheds. It is only through such intensive studies that they would be in a position to pin point short term pragmatic improvements and evolve guidelines to be followed by various sheds to control the consumption of fuel.

#### 21.0. Statistical data—An analysis.

21.1. We have analysed the statistical data pertaining to fuel consumption on various types of services. We find that there are two sets of figures of fuel consumption per 1,000 Gross Tonne Kilometres. One set of figures given in Statement No. 27(b) of the Annual Statistical Statement is published by the Railway Board. The other set of figures is given in Statement No. 5(a) which is prepared by the Railways but not published by the Railway Board.

21.2. The two sets of figures do not tally with each other. The position is given in Tables 4.11 to 4.14.

Table 4.11  
HSD oil consumed per 1,000 Gross Tonne Kilometres (Goods—Broad Gauge)\*

							(In litres)
Railways	1978-79	1979-80	1980-81	1981-82	Average	Best figure	Percentage by which average exceeds best figure
1	2	3	4	5	6	7	8
Central	3.62 (3.30)	3.41 (3.14)	4.13 (3.86)	4.22 (3.30)	3.40	3.14	8.3
Eastern	2.83 (2.70)	2.46 (2.34)	2.42 (2.31)	3.01 (2.76)	2.53	2.31	9.5
Northern	3.26 (3.10)	3.15 (3.03)	3.04 (2.91)	3.10 (2.99)	3.01	2.91	3.9
Northern Eastern	...	...	...	...	...	...	...
Northeast Frontier	...	...	...	...	...	...	...
Southern	3.83 (3.61)	3.63 (3.63)	3.80 (3.51)	3.85 (3.69)	3.56	3.43	2.0
South Central	3.37 (3.15)	3.34 (3.25)	3.35 (3.33)	3.07 (3.06)	3.20	3.06	4.6
South Eastern	3.86 (3.86)	3.56 (3.85)	3.95 (4.14)	3.98 (3.79)	3.91	3.79	3.2
Western	3.80 (3.53)	3.78 (3.53)	3.75 (3.39)	3.50 (3.45)	3.47	3.39	2.4

† Also Cf Para 6.0 of chapter II of Part V of our report  
\* This includes porporvion or mixed.

Source.—Figures outside the bracket are taken from statement, No. 27(b) (Annual Statistical Statements). Figures inside the bracket are taken from statement No. 5(a) (Obtained from Railway Board).



Table 4.12

## HSD oil consumed per 1,000 Gross Tonne Kilometres (Passenger—Broad Gauge)

(In litres)

Railways	1978-79	1979-80	1980-81	1981-82	Average	Best figure	Percentage by which average exceeds best figure
1	2	3	4	5	6	7	8
Central	4.28 (4.28)	4.43 (4.42)	5.62 (5.62)	5.85 (4.98)	4.82	4.28	12.6
Eastern	5.23 (5.15)	4.20 (4.06)	4.95 (4.85)	5.68 (5.18)	4.81	4.06	18.5
Northern	5.07 (5.03)	5.15 (5.13)	5.28 (5.25)	5.23 (5.18)	5.15	5.03	2.4
North Eastern	..	..	..	..	..	..	..
Northeast Frontier	..	..	..	..	..	..	..
Southern	5.48 (5.45)	5.44 (5.44)	5.37 (5.38)	5.21 (5.31)	5.39	5.31	1.5
South Central	4.86 (5.00)	5.04 (5.12)	5.06 (5.24)	5.01 (5.17)	5.13	5.00	2.6
South Eastern	5.03 (5.06)	4.43 (4.81)	5.01 (5.15)	5.19 (5.04)	5.01	4.81	4.1
Western	4.95 (4.98)	4.80 (4.85)	5.06 (5.15)	5.71 (5.50)	5.12	4.85	5.6

Table 4.13

## HSD oil consumed per 1,000 Gross Tonne Kilometres (Goods—Metre Gauge)\*

(In litres)

Railways	1978-79	1979-80	1980-81	1981-82	Average	Best figure	Percentage by which average exceeds best figure
1	2	3	4	5	6	7	8
Central	..	..	..	..	..	..	..
Eastern	..	..	..	..	..	..	..
Northern	4.82 (4.33)	4.94 (4.20)	4.68 (4.15)	4.57 (4.14)	4.20	4.14	1.4
North Eastern	..	..	..	..	..	..	..
Northeast Frontier	3.65 (4.01)	3.79 (3.89)	5.32 (4.06)	6.17 (4.14)	4.02	3.89	3.3
Southern	4.66 (4.76)	4.68 (4.79)	4.91 (4.93)	4.69 (4.80)	4.82	4.76	1.3
South Central	5.64 (5.67)	5.89 (5.79)	6.00 (5.88)	5.96 (5.74)	5.77	5.67	1.8
South Eastern	..	..	..	..	..	..	..
Western	4.32 (4.26)	4.46 (4.42)	4.15 (4.27)	3.81 (3.97)	4.23	3.97	6.5

Table 4.14

## HSD oil consumed per 1,000 Gross Tonne Kilometres (Passenger—Metre Gauge)\*

(In litres)

Railways	1978-79	1979-80	1980-81	1981-82	Average	Best figure	Percentage by which average exceeds the best figure
1	2	3	4	5	6	7	8
Central	..	..	..	..	..	..	..
Eastern	..	..	..	..	..	..	..
Northern	4.68 (4.70)	4.73 (4.72)	4.98 (4.98)	5.08 (5.02)	4.85	4.70	3.2
North Eastern	12.8	15.3	14.0	14.8	..	..	..
Northeast Frontier	6.60 (5.38)	5.95 (5.43)	8.03 (5.72)	5.74 (5.75)	5.57	5.38	3.5
Southern	5.48 (5.70)	5.52 (5.64)	5.58 (5.82)	5.55 (5.73)	5.72	5.64	1.4
South Central	5.94 (6.01)	6.15 (6.09)	6.32 (6.22)	6.23 (6.42)	6.18	6.01	2.8
South Eastern	..	..	..	..	..	..	..
Western	5.05 (5.08)	5.27 (5.34)	5.17 (5.26)	5.06 (5.18)	5.21	5.08	2.5

\* This includes proportion of Mixed.

Source.—Figures outside the bracket are taken from statement No. 27(b) (Annual Statistical Statements). Figures inside the bracket are taken from statement No. 5(a). (Obtained from Railway Board).



21.3. The figures in brackets are those shown in Statement No. 5(a) and the other are those shown in Statement No. 27(b). On further investigation, we are told that the rates of oil consumption as shown in Statement No. 5(a) should be considered as the reliable ones because in Statement No. 27(b), some of the Railways are showing the figures on the basis of oil issued to the locos and not on the basis of oil actually consumed by the locos. We are inclined to agree with this as otherwise North Eastern Railway would not have shown as high a rate of consumption as 34.6 for passenger services for the year 1975-76. The fact is that this Railway did not have any diesel locomotive in 1975-76. The normal rate of oil consumed per 1,000 Gross Tonne Kilometres by passenger service is around 5 litres.

21.4. It follows that this important statistical information of performance has not been compiled properly. We recommend that Statement No. 27(b) which is published should show the figures on the basis of actual consumption and not the issues.

21.5. We have already stated that the rate of consumption of oil per thousand Gross Tonne Kilometres is influenced by a large number of factors and would be different from train to train and section to section. A comparison of this index from one Railway to another or within a Railway from year to year, therefore, cannot be precise or uniform. Notwithstanding this limitation, this unit of performance compiled Railway-wise does assist the top level management in strengthening control, and provides a base for planning and for determining budgetary requirements.

21.6. An analysis of Tables 4.11 to 4.14 reveals the following broad features.

1. On the Eastern Railway for every thousand Gross Tonne Kilometres, 2.31 litres of oil were consumed in 1980-81, whereas on the neighbouring South Eastern Railway, the consumption per thousand Gross Tonne Kilometres was as high as 4.14 litres.
2. If the Eastern Railway can work to an average figure of 2.5 litres per thousand Gross Tonne Kilometres and Northern Railway to an average figure of 3.01 litres per thousand Gross Tonne Kilometres, the other Zonal Railways with similar or higher gross loads should normally be in a position to work up to these consumption levels.
3. There are fluctuations from year to year on the Central and Eastern Railways during the period 1978-79 to 1981-82. On the Central Railway, the consumption per thousand Gross Tonne Kilometres for Broad Gauge went up from 3.14 litres in 1979-80 to 3.86 litres in 1980-81. On the Eastern Railway, the increase was from 2.3 litres in 1980-81 to 2.76 in 1981-82.

4. Like the E.G. goods, on the E.G. Passenger side too, there have been violent fluctuations from year to year both on the Central and Eastern Railways. On the Central Railway, the oil consumed per thousand Gross Tonne Kilometres fluctuated from 4.28 litres in 1978-79 to 5.62 litres in 1980-81. On the Eastern Railways, the variation was from 4.06 litres in 1979-80 to 5.18 litres in 1981-82.

5. On the Metre Gauge goods the rate of consumption per thousand Gross Tonne Kilometres is the highest on the South Central Railway. The oil consumed on this Railway per thousand Gross Tonne Kilometres is on an average 5.7 litres, as compared to 4.2 litres per thousand Gross Tonne Kilometres on the Northern Railway Metre Gauge.

6. The consumption of oil per thousand Gross Tonne Kilometres for Metre Gauge Passenger is also the highest on South Central Railway, the average being 6.18 litres as compared to 4.85 litres on the Northern Railway.

21.7. The highest and the lowest rates of consumption on various Zonal Railways for passenger goods and services are shown graphically at pages 146 to 149.

21.8. The difference between the highest and the lowest figures is high on Central and Eastern Railways. While on other Railways this differential is within 10 per cent, on the Eastern Railway it is 16.3 per cent and on Central Railway it is about 23 per cent. Similar is the position when a comparison is made of the lowest rates of consumption with the average rates of consumption. While the difference on other Railways is from 2 to 4.6 per cent, on the Central and Eastern Railways, it is of the order of 8 to 9 per cent.

21.9. The Committee are of the view that the Railways should conduct detailed studies and field investigations and determine the reasons for such wide and abnormal variations. The fuel economy cells on the Zonal Railways and in the RDSO which we have already mentioned should be utilised fruitfully for such studies.

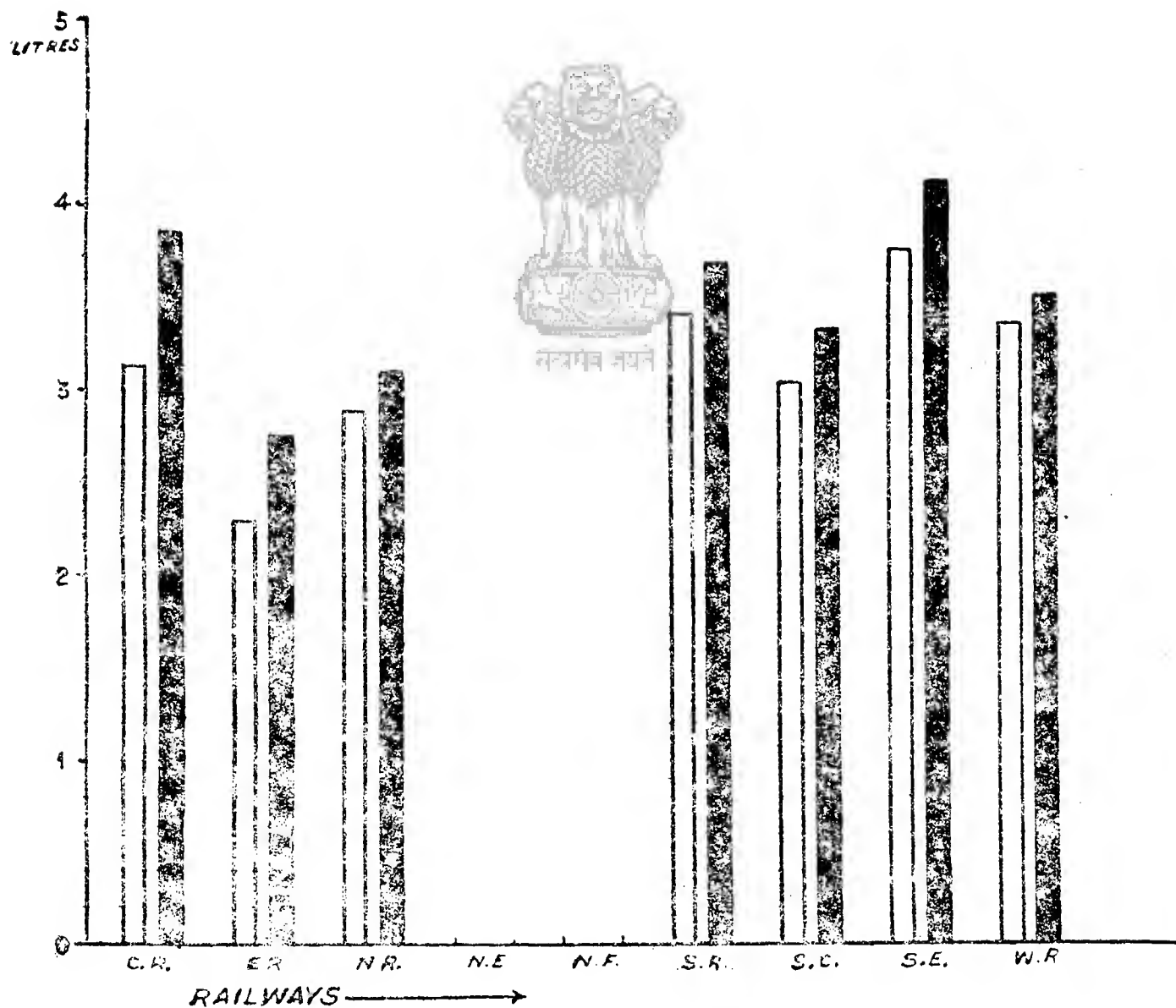
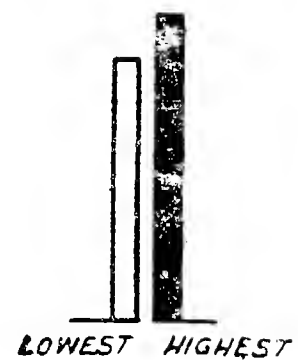
## 22.0. Monetary savings.

22.1. There being a number of imponderables, it is not possible to precisely quantify in monetary terms the results of the recommendations and measures suggested by us in this Chapter. The monetary savings would also depend upon the extent to which the Railways are able to effectively implement the recommendations and bring about fundamental improvements suggested by us.

22.2. Broadly, the financial benefit which may accrue to the system is expected to be of the order of Rs. 75 crores per annum, as per details shown at page 150.

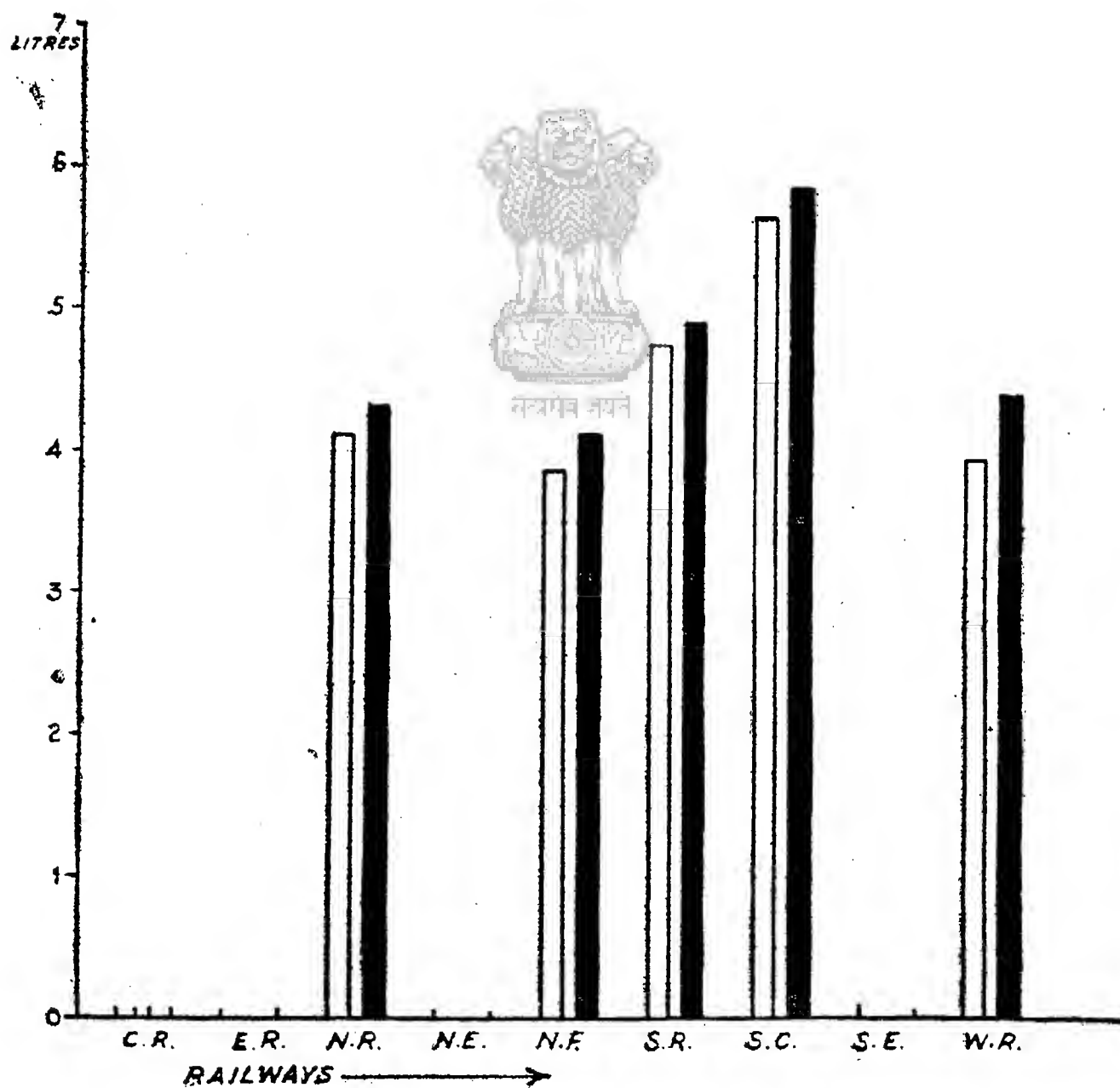


OIL CONSUMED/1000 GROSS TONNE KILOMETRES  
GOODS-BROAD GAUGE



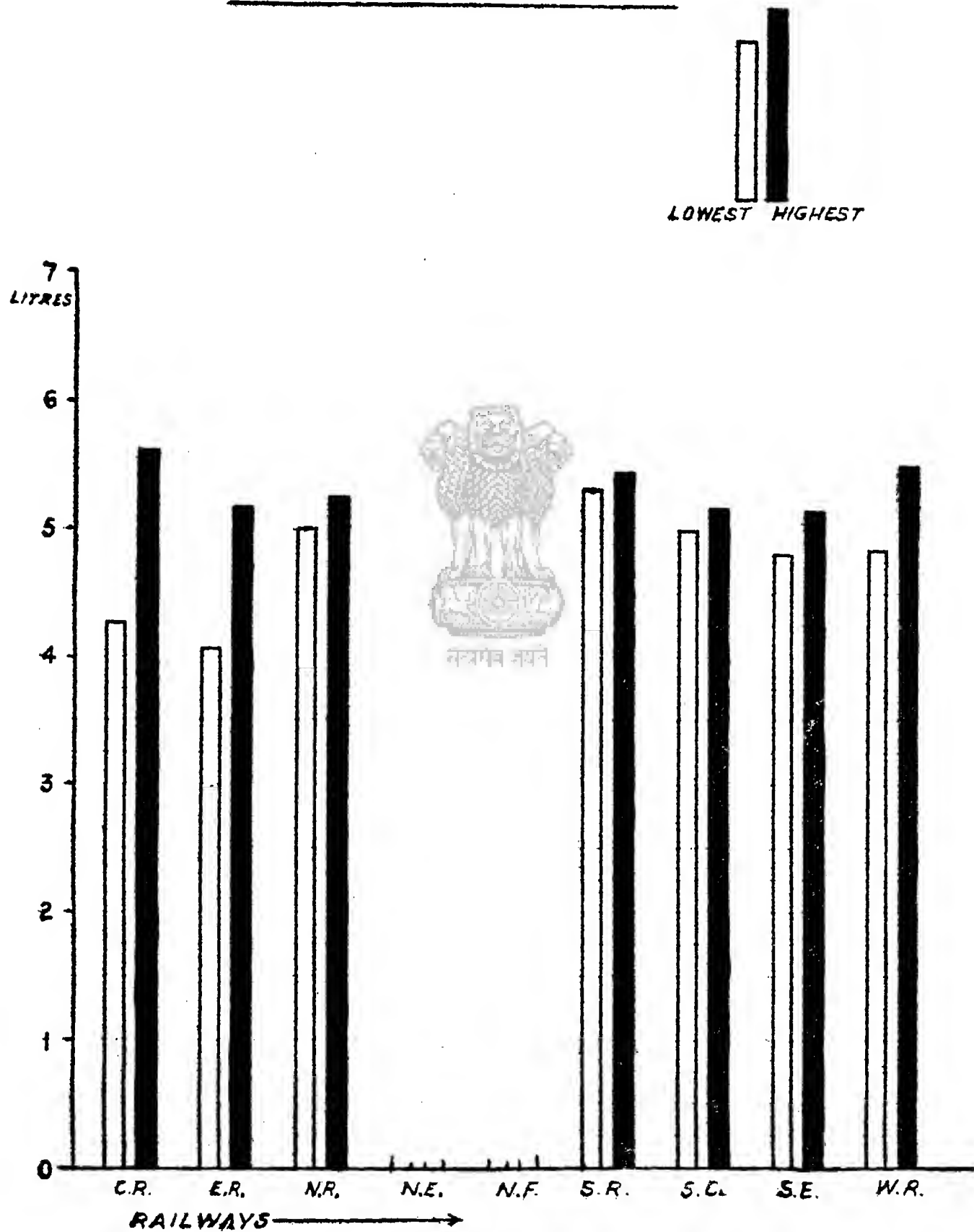


OIL CONSUMED/1000 GROSS TONNE KILOMETRES  
GOODS - METRE GAUGE



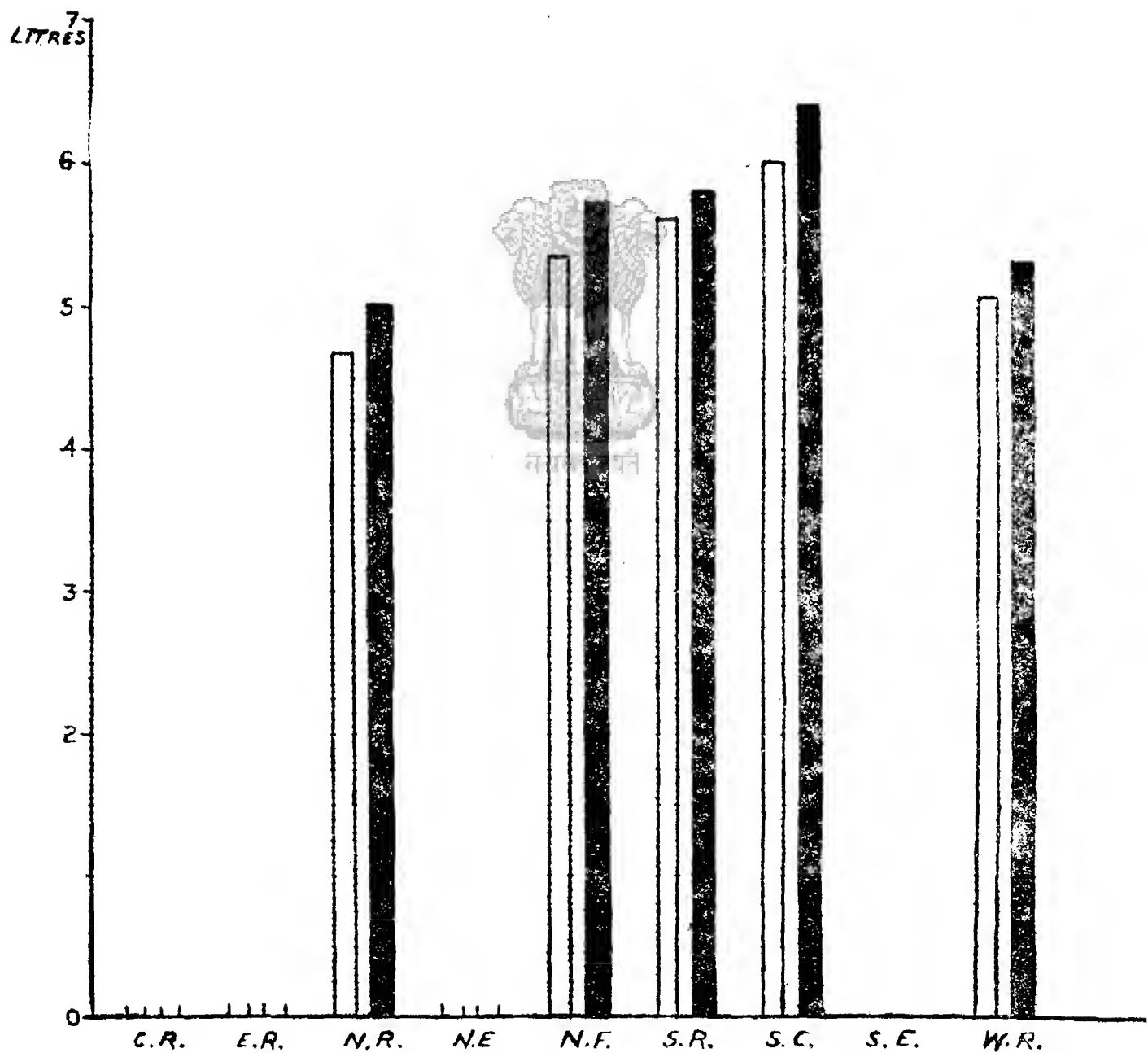


OIL CONSUMED/1000 GROSS TONNE KILOMETRES  
PASSENGER - BROAD GAUGE





OIL CONSUMED/1000 GROSS TONNE KILOMETRES  
PASSENGER - METRE-GAUGE





	(Rupees in crores)
1. By reducing the transit and handling losses.	0.3*
2. By switching off the engine when the detention is anticipated to be more than an hour.	2.5**
3. Savings in fuel oil consumed by sheds	0.5@
4. By setting up a proper control mechanism, better maintenance of track and locomotives, improvements in operating and driving practices etc.	34.9£
5. By welding of rails, use of heavier track and with improvements in the design of engines, coaches and wagons.	34.9*®
6. By implementing the above suggestions, consumption of lube oil will also go down atleast by 25 per cent.	4.1†
Total :	77.2

### 23.0. Conclusions .—

23.1. The Railways should reduce the permissible limit of transit and handling losses from 0.2 per cent to 0.1 of the receipts. Wherever the losses exceed this limit, shed-wise investigations should be carried out.

23.2. The Railways should examine the scope of taking supplies of HSD oil through pipelines instead of by tank wagons, especially at places where pipeline installations are close to Railway depots. There is also a strong case for an involvement of IOC in keeping a constant surveillance on the storage tanks of the Railways.

23.3. The Railways should suitably instruct the control office for passing on the message to the ASMs when the expected detention is more than one hour, so that in such cases the engine driver switches off the engine. The driver can send his assistant to ascertain the information from ASM. The incidence of weak batteries should be minimised and engine drivers should be suitably trained to promptly restart the engine after detention, when required.

23.4. The temporary fueling locations should be converted into permanent fueling depots and full facilities, including flow meters, fire fighting equipment, etc. should be provided. The incidence of tank-to-loco fueling should be eliminated.

23.5. The quality of maintenance of rolling stock should be improved and it should be ensured that worn

out parts, like piston rings, gaskets, fuel injection nozzles, are replaced in time.

23.6. The Acceleration Control Devices should be kept in order.

23.7. The poor maintenance of track has an effect on train resistance and consequently on fuel consumption. Urgent action should be taken by the Railways to improve the quality of track maintenance, increase the depth of ballast cushion and mechanise maintenance of track on important routes.

23.8. A scientific study should be carried out by RDSO and precise guidelines, consistent with safety, evolved regarding the imposition of speed restrictions.

23.9. Continuous welding of track can result in about 9 per cent saving in consumption of fuel in the speed range of 40-60 kilometres. Its pace should, therefore, be accelerated.

23.10. The use of heavier track can result in savings in fuel consumption by about 8.4 per cent at a speed of 75 kilometres per hour. The use of such heavier track, apart from being used on Group A to Group C routes, should also be used on Groups D and E routes.

23.11. There has been practically no change in the original design and specification of the diesel engine from the time it was procured from ALCO in 1962. The Railways should carry out a global survey of family of fuel efficient engines being used abroad and take suitable steps to incorporate necessary changes in the design and specifications of the components to make the engine more economic and fuel efficient.

23.12. The recommendations made by the Petroleum Conservation Action Group should be studied in detail by RDSO for their implementation wherever possible.

23.13. Maximum reduction in weight is possible by changing the existing oxichloride flooring to 'vinyle tile floor'. This should be vigorously pursued.

23.14. An early decision should be taken by the Railways about the marked carrying capacity of BOX N wagon. The ratio of pay load to tare weight of this wagon being more when compared to the corresponding BOX wagon, its introduction in the system would result in less fuel consumption. The deficiencies in the design should be removed.

23.15. The Railways should lay down norms and guidelines regarding shed consumption of oil.

23.16. There is no justification to issue lube oil from points other than the sheds. There is need for more research and development effort to reduce lube oil consumption.

\* Some Railways had exceeded even the existing permissible limit of 0.2 per cent. If they had worked to this limit, a saving of Rs. 35 lakhs would have resulted in 1981-82. There is a case for downward revision of the existing limit of 0.2 per cent to 0.1 per cent (0.1 per cent of the annual bill of Rs. 349 crores is Rs. 0.3 crores).

\*\* Cf. Para 6.10.

@ Cf. Para 15.4.

£ The amount of Rs. 34.9 crores represents a saving of 10 per cent in the consumption of HSD oil. This is not an over optimistic

figure considering that the lowest rates of consumption achieved in existing conditions on Central and Eastern Railways were 8 to 9 per cent less than their average rates of consumption. On the other Railways, this difference was 2 to 4.6 per cent.

\*® There is a distinct possibility of achieving an economy to an extent of atleast 10 per cent of the oil bill. This saving will be realised in stages depending upon the progress of welding of rails and improvements in the design of fuel engines etc. Cf. Paras 13.7 to 13.13 and 14.

† Annual bill of lube oil is Rs. 16.4 crores.



23.17. A study should be undertaken about the design, lay out and the configuration of the engine pipelines and steps taken to avoid oil being pilfered through the pipe joints.

23.18. Number of installations from where HSD oil is issued should be minimised and such locations manned by Assistant Mechanical Engineers.

23.19. Test bed facilities in DLW should be modernised. Adequate test bed facilities should also be developed in POH shops and sheds.

23.20. The present system of control mechanism for fuel management does not work efficiently. Trip rations have not been fixed scientifically and are neither backed by any theoretical formula nor test checked by Mechanical Engineers.

23.21. The fuel organisational structure needs to be strengthened.

23.22. Reasons for variations between the actual issue of oil *vis-a-vis* the norms fixed should be analysed in detail and the prevalent practice of giving general remarks, always trying to justify the excess, should be given up. An analysis, engine, driver-and sectionwise

should be available in the sheds indicating the specific fuel consumption etc. To facilitate this, micro processors should be installed.

23.23. Energy conservation cell should be opened in RDSO which should be assigned the task of studying and comparing the performance of locomotives homed at few sheds and pin pointing short-term pragmatic improvements, and evolve guidelines to be followed by various sheds.

23.24. Statement No. 27(b) of the Annual Statistical Statement should show figures on the basis of actual consumption and not issues.

23.25. There are violent fluctuations in the rate of consumption of fuel per thousand GTKM from year to year. The Railways should conduct detailed studies and field investigations to determine the reasons for these variations. The Fuel economy cells on the Railways and in the RDSO could be utilised for such studies.

23.26. It is not possible to accurately quantify in monetary terms the recommendations made by us. Broadly, the financial benefit to the system will be of the order of Rs. 75 crores per annum.





## CHAPTER V

### ECONOMY IN THE USE OF ELECTRICITY

#### 1.0. Introduction.

1.1 We have recommended\* in Part II of our Report on Transportation that electrification of all trunk routes connecting the metropolitan cities should be completed by 2000 AD on the basis of a time-bound programme. The Railways would then be able to carry on the Broad Gauge system 300 billion net tonne kilometres of goods traffic (out of a total of 337.5 billion net tonne kilometres) by electric traction. Regarding passenger traffic, out of 224 billion passenger kilometres

on Broad Gauge, 157 billion passenger kilometres would be carried by electric traction.

1.2. The electric traction bill even though presently less than the coal and HSD oil bills, will go on increasing from year to year in step with the progress on electrification.†

1.3. The consumption of electricity on traction during the last few years is given in Table 5.1

Table 5.1  
Electricity Consumption—Traction  
(In million kilowatt hours)

Year	Broad Gauge			Metre Gauge			Grand Total Columns (4)+(7) (In million kilowatt hours)	Amount (Rupees in crores)
	Consumption of Electricity by Loco- motive	Consumption of Electricity on EMUs Suburban Services	Total Electricity consumption (2)+(3)	Consumption of Electricity by Loco- motives	Consumption of Electricity on EMUs Suburban Services	Total Electricity consumption (5)+(6)		
1	2	3	4	5	6	7	8	9
1977-78	1,521.5	502.6	2,024.1	21.1	27.1	48.2	2,072.3	51.31
1978-79	1,492.9	536.1	2,029.0	20.9	27.2	48.1	2,077.1	55.80
1979-80	1,552.7	551.0	2,103.7	21.6	27.4	49.0	2,152.7	68.05
1980-81	1,618.8	551.6	2,170.4	21.4	28.3	49.7	2,220.1	79.32
1981-82	1,796.1	559.9	2,356.0	21.5	29.1	50.6	2,406.6	116.26

Source. 1. Indian Railways—Annual Report and Accounts (Annexure VII E) for respective years.

2. Demands for Grants of respective years, Demand No. 10.

1.4. In addition to the traction loads, electric power is needed to meet the requirements of stations, yards, workshops, sheds, etc. spread over the entire railway network. On an average, the electricity consumption on general services is around 1,000 million kilowatt hours per annum.@

1.5. We have in this Chapter discussed the salient features of the existing tariff structure and have given our suggestions about its rationalisation, and also how even within the framework of the existing tariff structure, the Railways can reduce their electricity bill.

#### 2.0. Tariff structure

2.1. We have already\* stated\*\* that the existing tariff structure made applicable to the Railways by the various State Electricity Boards suffers from several lacunae and needs to be rationalised. As this issue impinged on the finances of the Railways we had said that we would deal with it in the Part dealing with Resource Mobilisation. We have since examined the matter in consulta-

tion with the Central Electricity Authority and the Department of Power (Ministry of Energy) and our observations and recommendations are given below.

2.2. Electricity in the Indian Republic is a concurrent§ subject under the Constitution, but taxes on the consumption or sale of electricity are State@ subjects. The primary responsibility for meeting the power needs of different categories of consumers has been traditionally of the State Electricity Boards. The power projects undertaken by the Central Government are taken as a supplement to the State effort. The power generated by the Central units is fed into the grid system of the State Electricity Boards, and eventually it is their responsibility to distribute it further and fix the tariff structure.

2.3. The tariffs offered by State Electricity Boards are either flat energy charges or two-part tariffs consisting of :

1. A fixed charge component, which may vary with the magnitude of maximum demand.†

AND

\* Chapter VIII.

† The Railways have also programmed for large-scale electrification in the Sixth Five Year Plan, and going by their Memorandum on Electrification submitted to the Planning Commission, the thrust would have to continue in the Seventh and Eighth Five Year Plans.

@ Also Cf. para 16.2 of this Chapter.

\*\* Part II of our Report on Transportation, Para 11.0 Chapter VIII.

§ Item No. 38 of List III— Concurrent List of the Seventh Schedule (Article 246 of the Constitution of India).

@ Item No. 53 of List II—State List of the Seventh Schedule (Article 246 of the Constitution of India).

† "Maximum demand" in relation to any period shall, unless otherwise provided in any general or special order of the State Government, mean twice the largest number of kilowatt-hours or kilo-volt-amper-hours supplied and taken during any consecutive thirty minutes in that period—Section 2 (8) of The Electricity (Supply) Act, 1948.



2. A running charge component, based on actual consumption.

2.4. The tariff may also contain provisions for :

1. Adjustment of price having regard to the power factor of supply or the cost of fuel or both.
2. A minimum charge related to a past or prospective demand of a licensee.

2.5. Some of the State Electricity Boards are charging higher rates from the Railways for traction supply than from industrial consumers. This issue was raised by the then Minister for Railways in his speech at the Conference of Power Ministers during January, 1978 :

"One more aspect I would like to bring to your notice regarding tariff for energy. There is a difference between electricity charges for industry and for the Railways for traction to the disadvantage of the Railways e.g.

- (i) The payments of UPSEB are of the order of Rs. 7 crores per year. As per the industrial tariff, the payment would have been less by nearly Rs. 60 lakhs per year.
- (ii) In the case of DVC, Eastern Railway's payment is of the order of Rs. 429 lakhs and this would have been less by roughly Rs. 11 lakhs per year if Industrial tariff was followed.
- (iii) As far as S.E. Railway is concerned, the payment to DVC is of the order of Rs. 62 lakhs per year and in this case, the difference between the Industrial tariff and the Railway's tariff is of the orders of Rs. 3.26 lakhs per year.
- (iv) Against West Bengal, the total payment made by Eastern and S.E. Railways is of the order of Rs. 7.94 crores per year. The difference between the cost of industrial tariff and Railways' tariff is about Rs. 45 lakhs.

2.6. The Rajadhyaksha Committee on Power\* comprehensively examined the Power Tariff Structures and stated : "There are today no principles guiding the power tariff structure and decisions are made largely on grounds of political expediency coupled with some uninformed thinking on the correlation between cheap power and the economic development of a State. In particular, there is considerable evidence to suggest that in rural areas the beneficiaries of the power subsidies are the larger and more affluent farmers who could well afford to pay the real cost of their power supply.\*\*

2.7. This Committee, *inter alia*, recommended† ".....that minimum norms of performance, which should be lower than the optimal norms, be prescribed for all aspects of the SEB's performance. These norms would relate to its physical and financial performance i.e. capacity utilisation, consumption of fuel, staff costs, repair charges and inventory levels. Tariffs should be formulated on these minima so that the failure to achieve them reflects itself in a lower return to the SEB than has been recommended."

"In order to arrive at a set of norms, both minimum and optimal, based on uniform principles and methodologies for utility companies throughout the country, the Committee recommends the setting up of an expert group to be termed the Bureau of Electricity Costs and Prices (BECP) as an independent body under the Ministry of Energy on lines somewhat similar to the Bureau of Industrial Costs and Prices (BICP)."

"This would be a multi-disciplinary body consisting of economists, management accountants, tariff experts and electrical and industrial engineers etc. The BECP should be given statutory status to give it authority and prestige, though its reports would be recommendatory as far as the State Electricity Boards and the Central Government are concerned. The Bureau would be expected to evolve operating and financial norms on the basis of which a practical and sound system of tariffs could be evolved for different State Electricity Boards.

"In addition to overall performance figures Boards would work out their cost structure in respect of various consumer categories on the basis of guidelines given by the Bureau from time to time. The Bureau would have the authority to call for such records and make such reports as the Ministry of Energy may consider necessary. The tariffs evolved by the different State Electricity Boards would also be required to be shown to the Bureau, whose advice would be taken into account in finalising the tariffs."

2.8. By way of a representative analysis, we have analysed the various rate schedules brought into force by Uttar Pradesh State Electricity Board (UPSEB) with effect from 1 November, 1982 and we find :

1. For railway traction (other than Mughalsarai-Kanpur section), the rates charged are :

- (a) Demand charge of Rs. 30.00 per Kilo Volt Ampere (KVA) of billable demand† for the month.

PLUS

- (b) Energy charge of 50 paise per KWH. These rates are for 3-phase AC supply at 132 KV. Other industrial consumers who have a contracted demand of more than 200 KW are charged the same rates whether the supply taken by them is 132 KV or 66 KV or 33 KV or 11 KV or 3.3 KV. But they, unlike the Railways, are offered a rebate of 5 and 7.5 per cent if supply is taken at voltages above 11 KV and upto 66 KV and above 66 KV respectively.

2. For Railway traction in Mughalsarai-Kanpur section, a flat rate of 62 paise per KWH is charged. The industrial and other consumers, who have a contracted demand of more than 75 KW and upto 200 KW are charged rates as indicated in 1 above, but pending installation of suitable demand indicator/trivector meter, the consumers are charged a flat rate of 62 paise per unit. These consumers also enjoy the facility of rebates of 5 and 7.5 per cent if supply is

The high power Committee was appointed in January, 1978 and included representatives from the Department of Power, Central Electricity Authority and some State Electricity Boards. The Committee submitted its report in September, 1980.

\*\* Para 5.35 of the Report.

† Paras 5.78, 5.79 and 5.80 (page 83) of the Rajadhyaksha

Report on Power.

† The billable demand for the month shall be the actual maximum demand or 75 per cent of the contracted demand, whichever is higher. Provided that during the first three months of the supply, the consumer shall be liable to pay for the actual maximum demand only.



taken on voltages above 11 KV and upto 66 KV, and above 66 KV respectively. This rebate of 5 per cent is denied to the Railways even though the supply is taken at 25 KV.

- 3 The demand for any month for the purpose of levying demand charges is the highest average load measured in KVA during any 15 consecutive minutes period (integration period\*) of the month.

2.9. The Electricity Boards treat every point of supply as separate and levy maximum demand charges on the basis of arithmetical sum of the peak demands at each sub-station.† They do not accept the Railway's view that coincident demand of all sub-stations, as reflected on the power distribution network of the State, should be taken into consideration for computation of demand charges in view of the peak demand occurring at different points at different times.

2.10. The two issues which have always raised serious differences of opinion between the Ministry of Railways and some of the State Electricity Boards are :

1. The tariff offered to the Railways is higher than that applicable for industrial consumers.
2. The maximum demand@ is taken as the arithmetical sum of the peak demand at each sub-station rather than the coincident demand of sub-stations, as reflected on the power distribution network of the State.

2.11. Both these issues were considered by the Working Group set up by us on Railway Electrification for their deliberation and recommendations. This Working Group was headed by Adviser, Transport of the Planning Commission and included Joint Secretary, Ministry of Energy; Director, Central Electricity Authority and representatives of the Ministry of Railways, the National Thermal Power Corporation and Bharat Heavy Electricals Limited. The composition of this Working Group together with its terms of reference are given in Annexure A. 5.1 (pages 204-206).

2.12. The Working Group had extensive deliberations, discussed the various issues at length and made the following unanimous recommendations :

1. The energy charges component of two part tariff offered to Railways should not be higher than that applicable for industrial consumers.
2. On account of continuous demand throughout the day and the maximum demand reflected on grid system being the coincident demand of all the sub-stations the chargeable maximum demand should be computed on the basis of the coincident demand of all the sub-stations in particular State.
3. Maximum demand charges are required to be fixed rationally on the basis of the capital cost of generating plants and transmission and distribution networks. The cost of generating plants depend upon the peak demand which the

power station is supposed to meet. In case of Railway traction loads, it is the coincident maximum demand that is required to be met by the generating stations and not the arithmetical sum of the maximum demands at each sub-station.

4. The capital cost of transmission and distribution network is a function of reliability level required. It is considered that the Electricity Boards have to invest some additional amounts in transmission and distribution network by way of providing required redundancy in the system to ensure reliability and meet maximum demands at each sub-station. The incremental cost for providing additional redundancy in the transmission and distribution network could be built in by the State Electricity Boards by way of suitable provision in the tariffs.
5. It is, therefore, felt that the maximum demand charges in case of Railways could be slightly more as compared to industrial consumers. The exact extra charges for maximum demand on this account could be worked out in each individual case relating the same to additional investments made by Electricity Boards.

2.13 The Working Group further said: "The Group note that at present there is no agency for arbitrating in the disputes arising between Railways and State Electricity Boards in respect of reasonableness of tariff. As Railways is a very vital undertaking for the economy, it is essential that such a provision should be available to avoid illogical burden on the finances of the Railways. The Group recommend that an independent body with statutory status under Department of Power should be set up for arbitration of such disputes. If necessary, the existing statutes may be amended to give effect to this recommendation. Setting up of a similar authority namely Bureau of Electricity Cost and Prices (BECP) under Ministry of Energy has also been recommended by Committee on Power headed by Shri V. Rajadhyaksha for benefit of all the consumers."

2.14 We sent the above recommendations (paragraphs 2.12 and 2.13) to the Department of Power (Ministry of Energy) for their formal views. The Department of Power, after obtaining the comments of the Central Electricity Authority, agreed with the Working Group that the energy charge component of the two-part tariff offered to Railways should not be higher than that applicable to the industrial consumers.

2.15 However, in regard to the computation of maximum demand, the Department of Power did not agree with the unanimous recommendation of the Working Group (though it included Joint Secretary, Ministry of Energy; and Director, Central Electricity Authority). The Department of Power supported the State Electricity Boards on the consideration that the Railways avail themselves of the supply at different points and the effect of the Railway demands would be different on individual power feeders.

\* The 'integration period' varies from 15 to 30 minutes for various State Electricity Boards, Under Section 2(8) of the Electricity (Supply) Act, 1948, the integration period laid down is 30 minutes unless otherwise specified by the State Government.

† This problem does not arise in the case of UPSEB because there is a flat tariff for Mughalsarai-Kanpur section and for the remaining sections, supply is taken at one point and

Railways have their own transmission lines.

@ Maximum demand charges constitute about 30 per cent of the total energy charges billed by the concerned State Electricity Boards.

‡ The detailed comments of Department of Power are given in Annexure A-5.2.



2.16 We have deliberated over these issues and our recommendations are :—

1. In the matter of charging freight the Railways treat State Electricity Boards on par with industries. The tariff applied by them for transportation of coal is the same whether the consignee is a State Electricity Board or some other industry. There is, therefore, no justification for the State Electricity Boards to charge the Railways rates higher than those charged by them from other bulk industrial consumers. Any such discrimination is inequitable and must cease. If the industrial consumers are entitled to certain rebates, the same should also be offered to the Railways.
2. We agree with the Working Group that the maximum demand charges should be correlated to the capital cost of the generating plant. In the case of Railways it is the coincident maximum demand which is required to be met by the generating station and not the arithmetical sum of the maximum demand at each sub-station. It would, therefore, be reasonable to levy maximum demand charges on the basis of the coincident demand of all the sub-stations catered to by a particular grid system.
3. We also agree with the Working Group that the Electricity Boards may have to invest some additional amount in transmission and distribution network to provide redundancy in the system to ensure extra reliability of supply to the Railways. To compensate for that, the maximum demand charge component of the two-part tariff could be slightly higher for the Railways, but it should not be artificially pitched high in an effort to offset the losses now resulting from following a different method of computation of maximum demand.
4. The Railways should broadly specify to the State Electricity Boards as to what would be the maximum coincident demand at any time and indicate broadly the percentage amount which the State Electricity Boards would have to forego as a result of change in the method of computation of maximum demand.

2.17 In addition to the above issues, we have also considered the question of how the Railways should be treated *vis-a-vis* other Government Departments, and what should be the integration period for computing the maximum demand. On these two vital issues our recommendations are :—

1. The Railways should also be allowed exemptions from depositing security money as allowed by the State Electricity Boards to other Government institutions.\*
2. Looking to the nature of railway operations, bunching of trains is frequently unavoidable. Such bunching, however, results in overshooting of the maximum demand for few minutes in the integration period. These short-term peaks will inflate the energy bill even though the level of traffic for the balance period of

month might have been much lower. This is because the maximum demand charges for a month are computed on the basis of the largest number of KVAs in an integration period in the month.

We, therefore, feel that the integration period fixed by the State Electricity Boards should not be unduly low. The integration period of 15 consecutive minutes fixed by UPSEB is unduly harsh on the Railways. A longer integration period of 30 minutes, as fixed by most of the Electricity Boards, merits consideration and seems to be justified.‡

2.18. The differences between the State Electricity Boards and the Railways cannot be allowed to continue indefinitely, and it is time that the Central Government intervenes to help in narrowing down the areas of differences and lay down some guiding principles for the formulation of power tariff structure. To us it appears that presently the power tariff structures are not based on sound principles as otherwise the rates charged by various State Electricity Boards would not have shown wide variations.†

2.19. We are in agreement with the Rajadhyakshna Committee on Power that an expert group to be termed the Bureau of Electricity Costs and Prices should be set up to lay down the norms on the basis of which a practical and sound system of tariff could be evolved. We understand that the process had already been set in motion for the formulation of such a Committee.

2.20. Till the aforesaid Bureau of Electricity Costs and Prices is set up, we recommend that the Ministry of Railways should expeditiously prepare a comprehensive Memorandum on the Disputed Issues and a refer it to the Committee of Secretaries for their deliberation and recommendations. This Memorandum should, *inter alia* bring out the following issues for consideration :—

1. Tariff structure to be applied to the Railways *vis-a-vis* that applicable to other bulk industrial consumers.
2. Method of computation of maximum demand.
3. Magnitude of the integration period.
4. Arbitration in the event of differences between the State Electricity Boards and the Railways.
5. Deposit of Security Money.

2.21. In our opinion, full advantage has not been taken of the availability of a high-level machinery in the shape of the Committee of Secretaries of the Central Government and once the issues have been taken to this body, it is our belief that a fair, equitable and satisfactory solution should emerge.

### 3.0. Power factor.

3.1. We have already stated that the tariffs offered by State Electricity Boards may also contain provisions for adjustment of price, having regard to the power factor. For instance, in the case of UPSEB, if the

\* Rajasthan State Electricity Board has withdrawn exemption given to the Railways from depositing security money equal to three months consumption of power although other departments of the Central Government continue to enjoy this exemption.

‡ According to the information available with the Committee

only UPSEB and APSEB are having integration period of 15 minutes.

† In respect of heavy industry, 5000 Kilowatt, 60 per cent load factor, the rates vary from 19.42 paise per kilowatt hour for Chandigarh to 71.13 paise per kilowatt hour charged by U.P. State Electricity Board.



monthly average power factor\* falls below 0.85, the consumer shall pay on the billed amount a low power factor surcharge of one per cent for each 0.01 fall in power factor below 0.85 up to 0.80. In addition, if the power factor falls below 0.80, then the low power factor surcharge shall be charged at the rate of 2 per cent for each 0.01 by which monthly average power factor falls below 0.80. For the purpose of low power factor surcharge the billed amount shall mean the demand and energy charges, irrespective of voltage of supply. The tariff also specifies that for the improvement of power factor the consumers should instal shunt capacitors manufactured by standard manufacturers, and maintain them in healthy conditions.

3.2. Low power factor not only results in levy of penalty charges but also increases the maximum demand charges. For the same KW consumption, the maximum demand charges, which are based on KVA readings, would be less if the power factor is more. Thus even where the tariffs do not specifically provide for a low power factor surcharge, the Railways have to pay higher maximum demand charges if the power factor is low. The need to improve the power factor is, therefore, paramount.

3.3. We find that the Railways have been paying penalties and excess maximum demand charges due to low power factors. In the case of the grids at Gaya and Sonenagar, the Railways, due to low power factor, paid extra charges amounting to Rs. 39.13 lakhs and Rs. 47.78 lakhs respectively during the period 1977-78 to 1981-82.

3.4. The power factor can be improved by installing shunt capacitors. While there is no difficulty in providing shunt capacitors in the case of industrial loads, the problem is not that easy when it comes to installation of bank capacitors for traction loads.

3.5. The Railway Board had in July, 1975 approved the installation of a bank shunt capacitor complete with circuit breakers, reactors and control panels etc. to be installed on a trial basis at Manikui grid sub-station\* of South Eastern Railway.

3.6. We are told that the 3000 KVAR capacitor bank, though installed, has not been commissioned yet. It was energised in January 1983, but certain unexpected technical problems† developed. Tests were carried out with reduced capacity of 1600 KVAR but even then the problem remained.

3.7. South Eastern Railway who were associated with the test, *inter alia* mentioned: At Manikui, it is noticed that the Maximum Demand over a period of 24 hrs. varies from 2 MW to 14 MW. During the 49 minutes the capacitor bank was in circuit on 21 January, 1983 the load varied from 1 MW to 4.5 MW and the feeder currents varied from 0 to 200 A in Feeder 1 and from about 50 to 250 A in Feeder 2. With such wide fluctuations in the load current, instant to instant, there is every possibility of obtaining a leading power factor. Incidentally, as per the present scheme, there is no power factor meter. It is absolutely necessary that a power factor meter should be provided. Since both the transformers at Manikui are always working in parallel, it will be necessary to have a summation C.T. Further, it has to be mentioned that 1 per cent penalty

charges are being paid to BSEB whenever the power factor falls below 0.8 for every .01 reduction in power factor. In 1982, the highest M.D. was 15.5 KVA and, at that time, the power factor was 0.72 and load factor 46 per cent. To improve the power factor to 0.8 at such a condition so that no penalty charges are paid, the rating of the capacitor bank needed is about 1115 KVAR. If the power factor has to be improved to 0.80 (as per I.E. rules) the rating of Capacitor required, is 1785 KVAR at 25 KV. The present capacity of 3000 KVAR capacitor bank is overrated.‡

3.8. The trial was repeated in March, 1983, but the capacitor bank could not be commissioned even on 1/3 of its value. In this trial too, the feeder circuit breakers tripped when capacitor bank was closed. It is our opinion that the importance of the matter has not been fully appreciated by the concerned parties, and the matter has been allowed to drift.

3.9. The installation of bank capacitors is anticipated to pay handsome return on the cost of equipment to be installed. The Study Group on Economy in Energy Consumption§ estimated the rate of financial return to be around 47 per cent. Compared to the cost of equipment of Rs. 2.48 crores (for all the State Electricity Boards put together), the Study Group estimated a saving of Rs. 1.45 crores per year made up of :—

1. Saving in maximum demand	Rs. 1.18 crores
charges.	
2. Elimination of low power factor surcharge (in respect of Bihar and Orissa State Electricity Boards which were then levying the surcharge).	Rs. 0.27 crores
Total	Rs. 1.45 crores

3.10. The installation of bank capacitors would not only be of financial advantage to the Railways, but would also result in better utilisation of electricity which would otherwise be wasted.

3.11. We recommend :—

1. That the technical problems which arose during trial energisations should be overcome quickly. It should be reasonable to do so within a period of six months. For this purpose, a team of competent Electrical Engineers drawn from Bharat Heavy Electricals Limited, RDSO and Zonal Railways should be set up who should seriously study the technical problems and suggest solutions.
2. The aforesaid team should also examine whether it would be financially and technically prudent to have the capacitor bank with 3000 KVAR rating even though with a capacitor 1785 KVAR rating, the power factor can be improved to 0.85.
3. As indicated by the South Eastern Railway, power factor meter should be provided forthwith.

\* The monthly average power factor is calculated on the readings of tri-vector meter as per the formula given below and is round up to second decimal place:

$$\text{Power factor} = \frac{\text{KWH}}{\text{KVAH}}$$

\* Located in Bihar State.

‡ At the instant of switching on the capacitor bank, there was heavy in-rush current in the 25 KV feeder circuit breakers.

§ In May 1979, Government of India appointed a Commission to conduct a comprehensive enquiry into Government's expenditure. The Commission in turn appointed this Study Group to make an in depth study of energy consumption on the Railways. The Report of the Group was submitted in April 1980.



#### 4.0. Operating, maintenance and driving practices.

4.1. We have already discussed\* in the preceding chapter how the detentions enroute, out-of-course stoppages, and poor maintenance of track play havoc with oil consumption on diesel traction. We need only mention here that such factors will also increase the consumption of electricity in electric traction areas.

#### 5.0. Coasting†.

5.1. The Study Group on Economy in Energy Consumption had brought out (April, 1980) that by systematic coasting of trains, a saving of more than 5 per cent in energy consumption could be achieved, and that the drivers should be trained for practicing coasting technique as a regular measure.

5.2. We understand that coasting has been in vogue on the suburban sections for a number of years and it is claimed that it has resulted in reducing the energy consumption of suburban trains. No trial studies have, however, been conducted in regard to long-distance trains, both passenger and goods.

5.3. We endorse the recommendations made by the Study Group. In the first instance, the Railways should undertake extensive trials of coasting on the sides and diagonals of the quadrilateral, and determine the sites where coasting boards should be installed for the guidance of the drivers. These trials may be completed maximum within a period of one year. After completing trials on the quadrilateral, other important sections where the traffic density is comparatively high should be taken in hand.

5.4. The scheme of coasting can be a success only if the drivers are given appropriate training and instructions in this regard and suitable inspection machinery devised to monitor implementation. The Railways should look into these aspects concurrently with the trial to be conducted to determine the location of the coasting boards, so that within a period of one year the drivers adopt coasting technique as regular measure to save fuel.

5.5. The Railway Board may ensure that the trials as also the installation of the coasting boards is completed on all the energised routes within a period of six months and on the sides and diagonals of the quadrilateral within one year.

5.6. We also recommend that in case of new electrification projects, the trials are conducted and the coasting boards erected before a route is energised and operated.

#### 6.0. Electricity consumption and track standard.

6.1. In January, 1973, Northern Railway conducted preliminary investigations for assessment of saving in power consumption due to welded track using WAG 4 locomotive. The results of the investigation showed a reduction in the power consumption on short and long welded rails as compared with that on fish-plated

track. Encouraged by these results, RDSO undertook detailed investigations with a WDM 2 locomotive. The trials conducted clearly showed that in the speed-range of 40-60 kilometres the continuous welding of rails can result in about 9 per cent saving in consumption of energy. We expect similar savings in the case of electric traction.

6.2. We have already brought out† that the use of heavier rails results in reduction of rolling resistance and hence in fuel consumption. The trials conducted by RDSO with a WDM4 locomotive both on 90 R rails and 52 Kgs. rails revealed that if the track is of 52 Kgs rails instead of 90 R rails, the consumption of fuel per thousand GTKMs would be less by 0.26 per cent for a speed of 40 kilometres per hour and 8.41 per cent for speed of 75 kilometres per hour. We had accordingly recommended the use of heavier track at the time of renewal. This measure will equally improve the specific energy consumption@ in the case of electric traction.

#### 7.0. Technological innovations.

7.1. We have discussed the implications of a number of technological innovations impinging on efficiency and economy.

#### 8.0. Thyristor chopper control equipment for D.C. traction.

8.1. The suburban railway service on Western and Central Railways are electrified on the 1500 V DC system. The Calcutta underground system will be operated on 750 V-DC traction. Of all the train services viz. goods, passengers (non-suburban) and passengers (suburban), the specific energy consumption for the suburban service is the highest. In the years to come the country will witness a large growth of suburban passenger traffic. The need to improve upon the specific energy consumption in this area, therefore, merits immediate attention.

8.2. Presently, resistance control is being used on all 1500 V-DC EMUs operating in Bombay area. We are told that the resistance control technology will also be adopted for use on 750 V-DC metro cars for Calcutta underground system. The resistance control technology used is outdated and considerable energy gets wasted in resistances during starting. Further, during braking, kinetic energy of the train is wasted as heat energy, resulting in excessive wear of rail and wheel tread. No means are available to utilise this energy in a productive manner.

8.3. Rapid strides in semi-conductor technology have made it possible to replace the conventional rheo-static control for DC traction by thyristor chopper control equipment. We are told that the technology of chopper control has been fully established and that chopper controllers are becoming the standard equipment for all the new cars used on the underground and suburban railway system, working on D.C. traction, in many countries abroad.§§

\* Cf. paras 5.0, 6.0, 7.0, 8.0 and 13.0 of Chapter IV of this Report.

† Coasting means movement of a train under its own momentum without any traction effort when no power is consumed during the run. Coasting boards have been provided short of every station on the suburban sections to indicate to the drivers when they have to cut off the power supply and let the train roll into the station by its own momentum.

‡ Connecting the metropolitan cities of Delhi, Bombay, Calcutta and Madras.

§ Cf. para 13.8 of Chapter IV of this Report.

†† Cf. para 13.12 of Chapter IV of this Report.

@ KWIs consumed per 1000 GTKMs.

§§ France, Japan and U.K. are representative example.



8.4. The chopper controllers are claimed to offer a large number of advantages :—

1. Saving in the consumption of electricity due to the elimination of energy wastage in starting resistance of rheostatic control. In addition energy can be regenerated during braking and used by other trains in the section which are in traction mode at that time. The system can be designed to attain maximum coordination between regenerative and pneumatic braking. With regenerative braking, significant savings would result in energy consumption, especially on underground systems and suburban sections where starts and stop are frequent and take up relatively a large proportion of the time between the two consecutive stops.
2. While the saving in energy due to regenerative braking and elimination of starting resistances would depend upon the inter-section distances, characteristics of track etc, studies have revealed that power consumption with regenerative braking can be less by about 30 percent compared to that consumed under rheostatic braking.
3. Steady motor torque permits better utilisation of adhesion between rail and wheel and reduces the chances of slipping.
4. The starting acceleration is higher because of the constant tractive effort during starting rather than a saw-tooth effort with resistance starting.
5. The maintenance cost would be less due to replacement of power switching elements by static semi-conductors.
6. The traction effort is less affected by fluctuations in supply voltage.

8.5. We learn that while regenerating facility should be provided on underground and suburban coaches, feeding back of the regenerated energy to power distribution system need not be planned. The reasons mentioned are :—

1. It requires heavy investment in providing additional invertors at the traction sub-stations.
2. The wave shape of the regenerated current is distorted and hence may not be acceptable to the State Electricity Boards.

8.6. The regeneration feature to be installed should thus be so designed as to ensure that the regenerated energy is absorbed by other trains in the section in the traction mode, and the excessive energy if not used by the trains is consumed in the dynamic resistances\*.

8.7. There are conflicting views about the effects of harmonics generated by the choppers on the signalling and telecommunication circuits. Many signalling and telecommunication engineers claim that the harmonics generated by this equipment have

with the working of existing track circuits, block circuits, point operation, axle counters, automatic warning system installations etc. On the other side, a number of studies have been carried out in foreign countries and it has been established that if the choppers with fixed chopping frequencies are used instead of variable chopping frequency, along with a suitable design of input filter, the harmonics generated would not be more than those generated presently by DC traction sub-stations and that they will not interfere with the signalling systems.

8.8 We find that RDSO had issued a technical specification in December, 1972 for the development of complete chopper control equipment for installation on 1500 V DC EMUs. We also learn that global tenders for six sets of choppers control equipment for EMU stock were invited in 1974 but no orders were placed mainly due to lack of confidence in the system.

8.9 It is understood that projects have now been assigned to Bhabha Atomic Research Centre and Bharat Heavy Electricals Limited for designing, fabricating, installing and testing of this equipment on the EMU stock run on the Bombay Metropolis suburban section.

8.10 We find that the idea of installing chopper control equipment on 1500 V DC EMUs was conceived in 1972 when RDSO had issued a technical specification of the equipment. Though more than a decade has passed, no significant thrust has been made, and the provision of such an essential equipment is being delayed at the cost of both economy and efficiency. The Railways have allowed the matter to drift and have not made any headway in using this innovation which has considerable potential of reducing energy consumption. The reduction in the consumption of electricity with the installation of this equipment is so pronounced in the case of underground mass transit system that it is imprudent to hang on to the outmoded technology of rheostatic control.

8.11 We, therefore, recommend that :—

1. Choppers should be introduced on the motor coaches deployed on the Calcutta underground railway. On the suburban system of Bombay Metropolis this should be taken in hand on a high priority.† The change over of the technology from resistance control to thyristor control (with regenerative facility) should be completed within 1 to 2 years.
2. As the indigenous development of this item will be a long-drawn affair, while indigenous production may be organised, the Railways for the interim period should take urgent action to import the equipment till these are locally available.

#### 9.0 Thyristor locomotives-AC traction.

9.1 The thyristor control system on AC traction replaces the conventional control of tap changer. We find that for evaluation of this system, a contract for conversion of WAG locos is being executed by Electronics Corporation of India Limited in association with Bhabha Atomic Research Centre. The performance of prototype equipment for the first loco, which was designed fully with indigenous effort, has not been satisfactory. We are told that the Electronics Corporation

\* When the train is in motion and the supply of current from OHE is cut out, the motor acts as a generator and converts the kinetic energy of the train into electric current. This current is consumed in the electrical resistances (dynamic resistances), whereby slowing the train. This method of braking where the

kinetic energy of the train gets converted into electric energy is referred to as dynamic braking, as distinct from pneumatic braking.

† Later on use of choppers can be extended to EMU services in other areas too.



of India Limited have now decided to convert the remaining 9 locos with the technology of Brown Boveri Corporation, Switzerland.

9.2 We understand from experts that while regenerative braking would be of a definite advantage on DC traction, on AC traction, locomotives with regenerative facility should be acquired only for certain captive sections where there are long stretches of severe grades, like the Waltair-Kirandul section. This is because :—

1. The electrical circuit is more complicated and would need greater skill and cost for maintenance.
2. The wave form of regenerated current will be distorted and may not be acceptable to the power supply authorities. The power factor will also be poor.

9.3 We recommend that the thyristor equipment (now proposed to be developed on the technology of Brown Boveri Corporation, Switzerland) should be developed with promptitude, say, within a year or two and given urgent and extensive trials by RDSO, in collaboration with Eastern and South Eastern Railways having extensive main line and suburban electrified routes. The merits and demerits of the new system should be clearly evaluated and the Railways should come to a definite decision whether or not, on cost and operational considerations, the thyristor should have the regenerative feature.

9.4 We further recommend that the Railways should simultaneously study the effects of harmonics generated by the new equipment on the signalling and telecommunication circuits so that the modifications, if any, required to overcome these effects, are made in time.

#### 10.0 Development of series capacitors.

10.1 We have stated\* in Part II of our Report on Transportation that the future trailing loads of freight trains have to be increased to economise on ground capacity and rolling stock investments. The number of trains in terms of 4,500 tonnes trailing loads would, in the case of coal, be almost half as compared to what is under the present system. We had accordingly recommended running of such heavier trains as also the possibility of increasing the load still higher as the traffic develops.

10.2 With the growth of traffic and proposal to run 4500/7500 tonnes freight trains, the voltage drop in the overhead equipment (OHE) will become a limiting factor. To overcome this problem, certain Railways abroad have installed series capacitors on 25 KV AC traction system.

10.3 The advantages of series capacitors are :—

1. As the series capacitors compensate for the OHE reactance, the voltage drop is reduced.
2. The power factor at the sub-station is improved.
3. The system stability is increased.
4. The line losses decrease as the total current draw by the loads decreases.
5. This equipment is of particular advantage where due to practical difficulties it is not possible to

locate an intermediate sub-station between the feeding sub-stations, or till a new sub-station is installed.

10.4 RDSO had made a proposal in November 1981 for development of series capacitors for use on :—

1. Sonenagar-Karmanasa and Koderma-Nimiaghat sections of Eastern Railway. These sections were selected as the spacing between the sub-stations on these sections is 90 kilometres and 84 kilometres respectively. It was anticipated that with the increase in traffic, the voltage will fall below 19 KV, the minimum permissible value. Unless, therefore, an alternative is found, provision of an additional sub-station for these sections would be necessary. The cost of one set of series capacitors was estimated to be around Rs. 10 lakhs which is much less than the cost of a sub-station which is about Rs. 1 crore.
2. Ennore-Sullurpeta section of Southern Railway. The spacing between these two sub-stations is 69 kilometres. The approximate cost of the equipment was estimated to be about Rs. 6 lakhs.

10.5 RDSO wanted the above two developmental works to be included in the budget for 1982-83. The proposal was, however, not approved by the Railway Board because RDSO did not work out the "approximate quantitative advantages likely to result due to decrease in the maximum demand or elimination of additional sub-station vis-a-vis the cost of series capacitors involved".

10.6 The development of series capacitors proposed by RDSO are in the nature of trial works and clearly chargeable to Revenue. Their inclusion in the works programme is, therefore, not necessary. The problem of voltage drop has to be looked into with expedition so that measures are taken well in time to overcome this problem in the background of growth in traffic and heavier freight trains.

10.7 We recommend that RDSO should urgently make a techno-economic valuation of series capacitors, and send a comprehensive proposal to the Railway Board who should examine the same on a priority basis. If the theoretical evaluations indicate that the installation of series capacitors would be of advantage to the system we suggest that the experiment should be tried out on high priority.

10.8 We are told that indigenous capability to develop such capacitors exists. There should, therefore, be no difficulty in getting them manufactured and trying them out in the field. These trials should be conducted by RDSO in association with the concerned Railways, namely, Eastern and Southern Railways. The entire process should in our view, be completed within twelve months.

#### 11.0 Designs of vehicles/wagons.

11.1 In the preceding Chapter on economy in the use of oil, we have already discussed† about the scope for economy in oil consumption by reducing the vehicle weight and by incorporating design changes in the wagons.

11.2 We would not deal with these issues again but would mention that vehicles with reduced weight and wagons of improved design would also reduce the specific energy consumption on electric traction.

\* Para 5.2

† Cf. paras 14.12 and 14.15



## 12.0 Specific energy consumption statistical analysis :—

12.1 The rake of consumption of electric energy per thousand Gross Tonne Kilometres is influenced by various factors such as the train load, gradient of the section, trailing stock resistance characteristics, out of course stoppages, efficiency of the motive power unit etc.

12.2 Table 5.2 to 5.4 give the electric energy consumed per thousand Gross Tonne Kilometres for different types of services. The highest and the lowest rates of consumption on the various zonal railways for passenger and goods services are shown graphically.

Table No. 5.2  
Electricity Consumed per 1,000 Gross Tonne Kilometres (In Kilowatt Hours)  
Broad Gauge (Passengers)\*

Railways	1977-78	1978-79	1979-80	1980-81	1981-82	Average	Lowest figure	Percentage by which average exceeds lowest figure
Central	23.7	24.8	24.8	23.9	24.4	24.3	23.7	2.5
Eastern	22.5	25.3	27.0	23.9	21.9	24.1	21.9	10.0
Northern	19.7	20.1	20.0	19.7	19.4	19.8	19.4	2.1
North Eastern	...	...	...	...	...	...	...	...
Northeast Frontier	...	...	...	...	...	...	...	...
Southern	...	...	...	...	...	...	...	...
South Central	...	...	...	14.8	12.6	13.7	12.6	8.7
South Eastern	25.1	21.1	24.9	24.8	25.0	24.2	21.1	14.7
Western	21.4	21.5	21.4	21.1	21.0	21.3	21.0	1.4

This includes proportion of Mixed.

Source.—Annual Statistical Statements—Statement No. 27(b).

Table No. 5.3  
Electricity consumed per 1,000 Gross Tonne Kilometres (In Kilowatt Hours)  
Broad Gauge (Goods)\*

Railways	1977-78	1978-79	1979-80	1980-81	1981-82	Average	Lowest figure	Percentage by which average exceeds lowest figure
Central	13.7	13.9	14.1	15.2	14.1	14.2	13.7	3.6
Eastern	11.9	11.7	14.8	18.0	12.3	13.7	11.7	17.1
Northern	10.0	10.4	9.9	9.7	10.9	10.7	9.7	10.3
North Eastern	...	...	...	...	...	...	...	...
Northeast Frontier	...	...	...	...	...	...	...	...
South Central	...	...	...	11.5	9.0	10.2	9.0	13.3
South Eastern	12.2	12.8	13.0	13.6	14.3	13.2	12.2	8.2
Western	11.6	10.6	11.0	11.1	10.9	11.0	10.6	3.8

\* This includes proportion of Mixed.

Source.—Annual Statistical Statements—Statement No. 27(b).

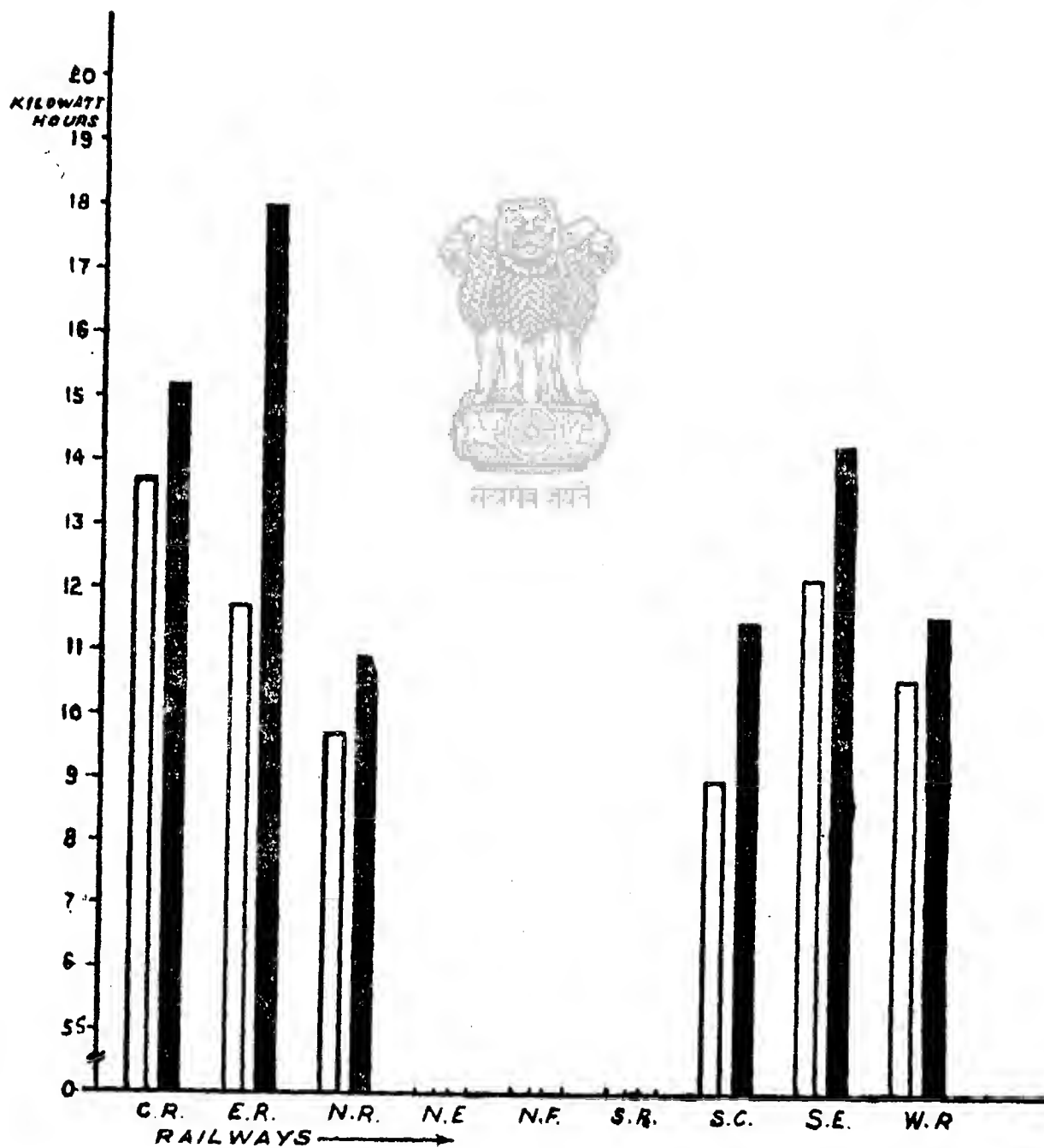
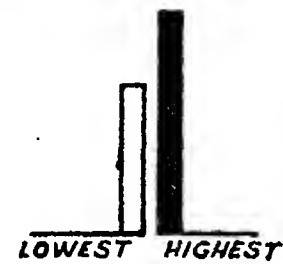
Table No. 5.4  
Electricity consumed per 1,000 Gross Tonne Kilometres (In Kilowatt Hours)  
Metre Gauge (Passengers)

Railway	1977-78	1978-79	1979-80	1980-81	1981-82	Average	Lowest figure	Percentage by which average exceeds lowest figure
Southern	19.8	20.1	20.4	20.5	20.0	20.2	19.8	2.0
South Eastern	16.0	16.0	16.3	16.0	15.5	16.0	15.5	3.2

\* This includes proportion of Mixed.

Source.—Annual Statistical Statements—Statement No. 27(b).

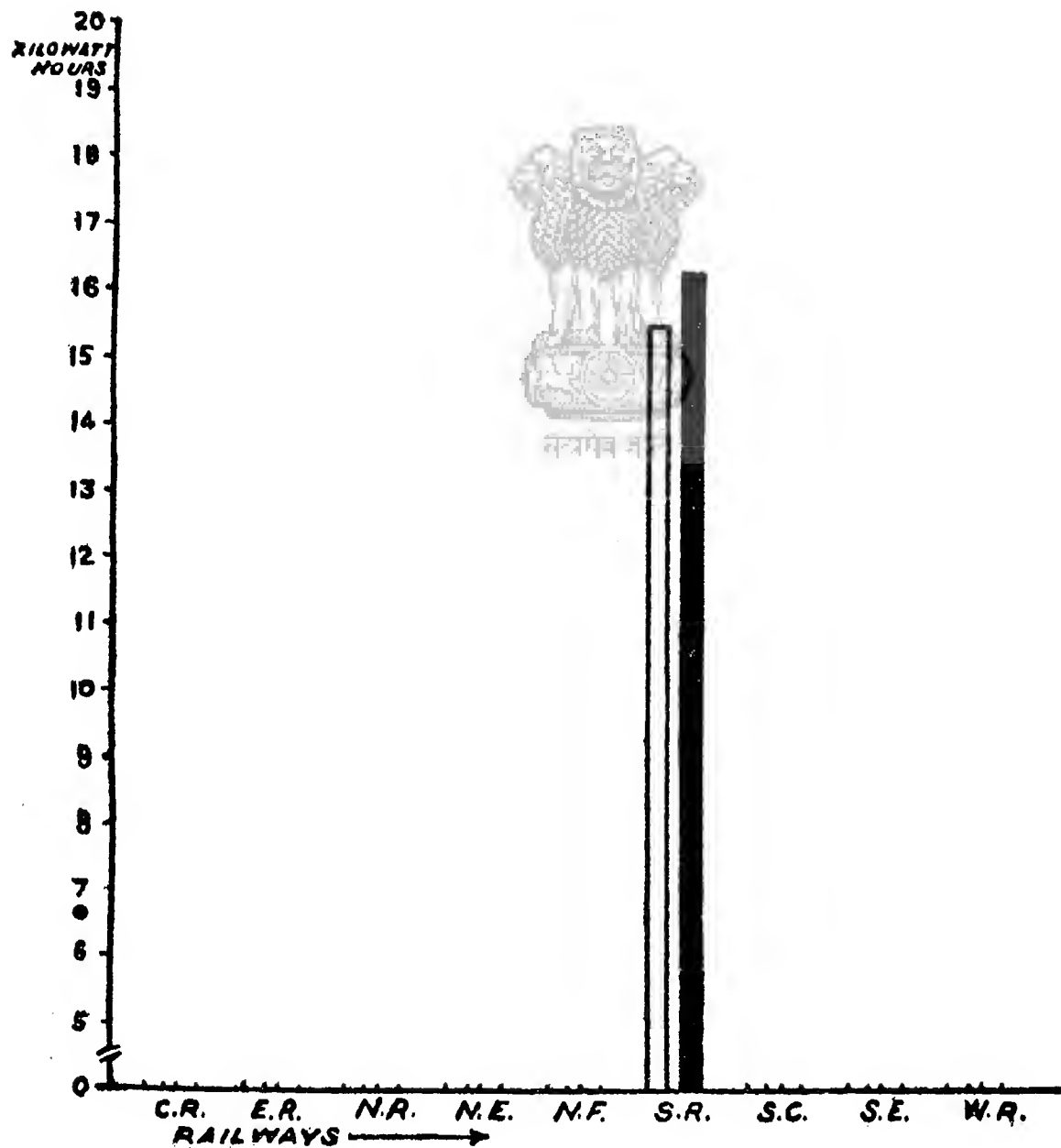
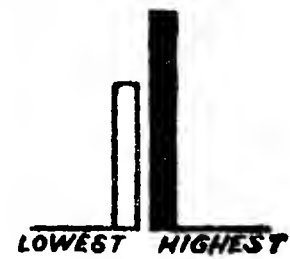


ELECTRICITY CONSUMED (K.W.H)/1000 GROSS TONNE KILOMETRESGOODS BROAD GAUGE

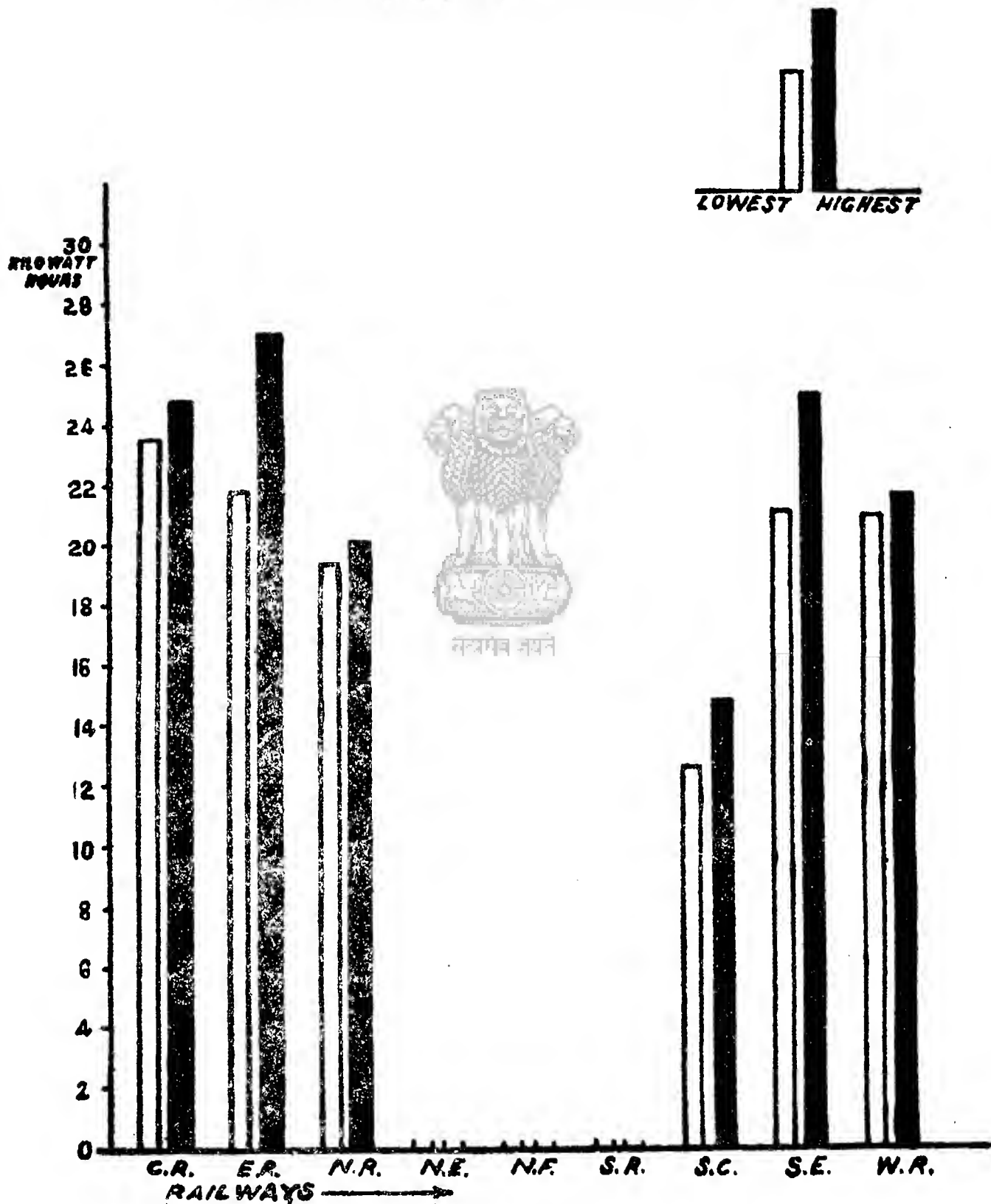


ELECTRICITY CONSUMED (K.W.H)/1000 GROSS TONNE KILOMETRES

GOODS METRE GAUGE



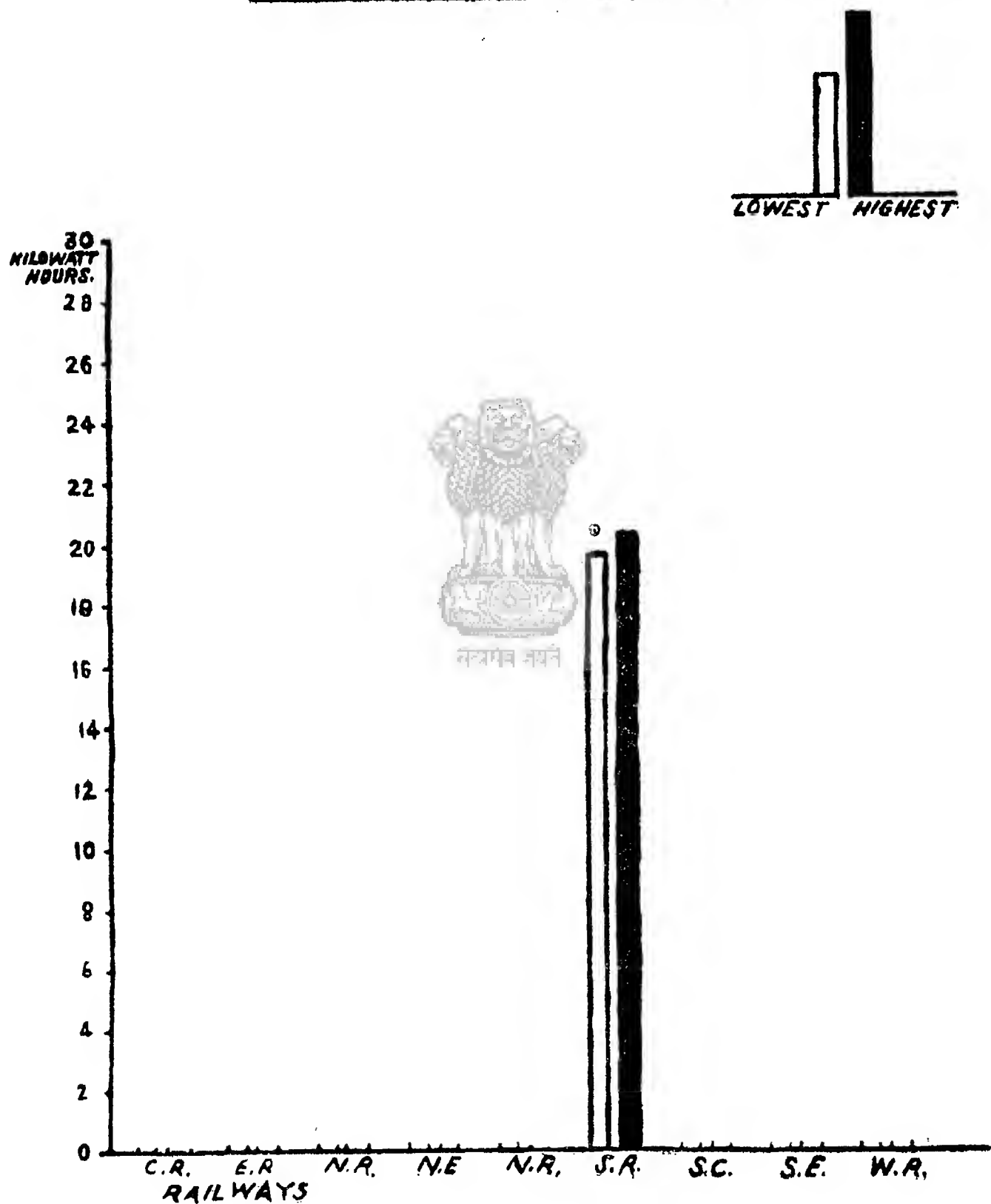


**ELECTRICITY CONSUMED (K.W.H)/1000 GROSS TONNE KILOMETRES****PASSENGER BROAD GAUGE**



**ELECTRICITY CONSUMED (K.W.H)/1000 GROSS TONNE KILOMETRES**

**PASSENGER METRE GAUGE**





12.3 There are no meters installed on electric locomotives and EMU motor coaches. The Railways efforts to obtain such equipment even from suppliers abroad have failed.

12.4 In the absence of metering equipment, the apportionment of total energy consumption amongst different types of services is done as follows\*:-

1. Energy consumed for non-traction purposes viz signalling installation, staff quarters, station lighting etc. is assumed. This would vary from 3 to 5 per cent of the total consumption and is to be subtracted from the total consumption.

2. For EMUs, the norms adopted are :-

DC EMU	43 KWH/1,000 GTKM
AC EMU	40 KWH/1,000 GTKM

3. The electricity consumption by mail/express and passenger trains is assessed on the following basis :-

Railway	Mail & Express	Passenger
	(in KWH per 1,000 GTKM)	
Central	17.80	25.10
Eastern	17.80	25.10
South Eastern	17.80	25.10
Northern	18.80	25.70
Western	18.80	25.70

12.5 The consumption by goods services is derived after subtracting the energy consumption for the above three purposes from the total consumption.

12.6 We find that on Eastern Railway, the electric energy consumption per thousand Gross Tonne Kilometres for goods traffic varied from 11.7 Kilo Watt Hours in 1978-79 to 18.0 Kilo Watt Hours in 1980-81. The percentage by which the average specific energy consumption on this Railway exceeded the lowest consumption rate is around 17 per cent. On the South Central and Northern Railways too, the average rates of consumption exceeded the corresponding lowest figures of consumption by more than 10 per cent.

12.7 Since no norms of specific energy consumption for goods services have been fixed, it is not possible to compare the actual consumption *vis-a-vis* what it should have been as per the norms fixed. The wide fluctuations in the electric energy consumed per thousand Gross Tonne Kilometres do, however, indicate that all is not well.

12.8 The Committee have deliberated over this issue at length and have come to the conclusion that unless norms for goods traffic are also fixed there can be no worthwhile control mechanism to judge whether or not the consumption of electricity for hauling a particular level of traffic is high.

12.9 We recommend that RDSO jointly with the Zonal Railways, should conduct extensive field studies and fix norms for goods traffic also. For this purpose,

representative sections†, loads, speeds and type of rolling stock should be selected and realistic norms fixed.

12.10 Once the norms are fixed for goods traffic as well, the Railways would be able to make a realistic comparison of the actual consumption *vis-a-vis* what it should have been. Any abnormal variation between the two sets of figures would call for a detailed analysis which may be sub-station-wise or section-wise as is found feasible by the Railways. The analysis should clearly bring out the detentions enroute, the number of out-of-course stoppages, alarm chain pullings etc. so that appropriate remedial measures are taken to control these factors.

12.11 We further recommend that to have an idea of the health of the locomotives and to ascertain if the motive power units are giving the desired efficiency, a system of test checking the specific energy consumption of locomotive should be introduced. These locomotives should, during the course of test check, be fitted with metering equipment and the actual energy consumption compared with the norms. The frequency of test checks should be such that this is possible for all the locomotives once a year. For this purpose, few meters, if not already available, should be procured.

### 13.0 General services.

13.1 We would discuss certain aspects of economy in the use of electricity in what may be called 'general services'. The scope for economy in this area is also substantial.

### 14.0 Energy conservation in workshops.

14.1 Useful data was compiled by RITES as part of their Master Plan Study for workshops. We had made an analysis of this data and had brought out in Part V of our Report on Production and Maintenance of Rolling Stock that per equated Broad Gauge wagon overhauled, the consumption of electricity varied from 0.20 KWH to 0.75 KWH, industrial gases between 8.5 cubic metres and 30 cubic metres and grease between 0.9 and 3.0 KG. We noted that this lack of standardisation assumed importance in the background of a total consumption in excess of 140 million KWH of electricity and 2.7 million cubic metres of industrial gases per annum in all the workshops put together.

14.2 Our own visits have convinced us that a large percentage of machine tools and equipment in the workshops are of obsolete designs. These equipment, besides resulting in low productivity and poor quality of the output have high specific energy consumption. It is important, therefore, that in the workshop modernisation scheme, this aspect is adequately taken care of.

14.3 The areas which can be considered for economy in energy consumption are replacement of belt and pulley drives by individual motor drives, replacement of a large number of low capacity compressors with lesser number of higher capacity compressors, use of good and proven modern welding equipment and use of heavy duty machine tools with better instrumentation and controls.

14.4 To introduce such an approach, the Railways should lay down guidelines for the officers engaged in

\* This procedure as also the norms for passenger and EMU services have been laid down by RDSO after conducting studies and tests.

† Central Railway ... Bhusaval-Igatpuri  
Western Railway ... Vadodara-Anand-Ahmedabad  
Eastern Railway ... Mughalsarai-Sonnagar-Gaya

Northern Railway ...  
South Eastern Railway

Ghaziabad-Tundla-Kanpur  
Tatanagar-Rajakharswan-  
Bondamunda.

and any other sections considered necessary.

8† Para 21.1 of Chapter II.



planning and procurement of machinery and plants. This responsibility could be given to COFMOW.

#### 15.0 Energy conservations at stations, service buildings etc.

15.1 We find that a large number of measures have been employed by the Railways to achieve economy in the consumption of electricity on general services. Some of these are :—

1. Introduction of partial lighting on platforms during non-train timings.
2. Adoption of fluorescent lamps, High Pressure Mercury Vapour lamps/Sodium Vapour lamps in lieu of incandescent lamps.
3. Switching off water coolers during night time at stations where there are no passenger trains during the night.
4. Fixation of quota of electric consumption at stations.
5. Reducing the number of light points in service buildings.

15.2 More important than delineating the economy measures is to ensure their implementation. It is not uncommon to see the lights and fans on in rooms for hours together before and after office timings even when no one is present. Unless the Railways exercise greater vigilance and control in this regard, they will not be able to materially cut down this national wastage of a scarce resource.

15.3 We suggest that an analysis should be carried out by the Divisions and they should fix a monthly quota of electricity consumption in respect of major stations, and service buildings. A suitable inspecting and monitoring machinery should be devised by the Divisional Railway Managers to ensure that the lights and fans etc. are switched off when not required, and that the station masters and others on duty effectively implement the orders in this respect.

15.4 We also suggest that the actual consumption of electricity should be compared every month with the quota fixed and for any abnormal variations, investigations should be carried out. The Railways should suitably reward officials who over a period bring about significant savings in the consumption of electricity by proper implementation of the orders on the subject.\*

15.5 It is quite clear that unless more sincere and earnest efforts are made in this direction and energy consciousness developed amongst the staff, no amount of 'paper' instructions would help.

#### 16.0 Organisation.

16.1 We find that while for steam and diesels the Railways have specially earmarked fuel economy cells, for electric energy there are none. In the absence of dedicated electric energy economy cells, the Railways can hardly exercise worthwhile control on the use of electricity.

16.2 By way of illustration, we may mention that the consumption of electricity on general services showed an erratic trend in the last few years. The electricity

consumption which was 904 million kilowatt hours in 1977-78, rose to 1,315 million kilowatt hours in 1978-79, then dropped to 842 million kilowatt hours in 1979-80 and again rose to 1,096 million kilowatt hours in 1981-82. We have been unable to elicit a satisfactory explanation for such abnormal fluctuations.

16.3 Similarly the electricity bills as pertinent to traction may indicate very wide fluctuations, which to a discerning group of General Manager, Chief Operating Superintendent, Chief Mechanical Engineer and Chief Electrical Engineer may clearly indicate the need for certain revolutionary changes in the operating methods and practices, breaking of 'bunching knots' of trains, arresting leakages, losses in transmission, wasteful detentions and avoiding the juice flowing even during elongated idle hours on run.

16.4 With the emphasis placed on railway electrification and the continuous hike in tariffs applied by the State electricity boards, the electric energy bill will continue to rise. It is time that the Railways realise the paramount need for economy in the use of this scarce resource. They should forthwith set up proper and well-conceived electric energy saving organisations on the Zonal Railways and in production units.

16.5 The set up on the Zonal Railways should be headed by senior administrative grade officers so that they are able to hold meetings at equal level with their counterparts in the State Electricity Boards. They would also have sufficient experience and knowledge to suggest design and specification changes and at the same time would be able to exercise proper control over the performance of the divisions, the electrical wings of most of which are manned by junior administrative grade officers. These cells should also have one or two competent electric engineers and inspectors with analytical bent of mind.

16.6 The effort on the Railways should be backed up by the Divisions. There too electric energy saving cells should be constituted with adequate back-up support of intelligent supervisors and junior officers.

16.7 An important area of activity of the energy economy cells would be to analyse the electricity bills and consumption patterns from month to month and bring out areas of wastage and vulnerability for the personal attention of General Managers. These cells should continuously look into the technical solutions for economising in the use of electricity such as improved training of running staff, traction controllers, train controllers and station master, more intensive utilisation of electric locomotive, reducing the losses of electricity during transmission, use of improved equipment at sub-stations and suggestions for improving the design of electric locomotives/EMU stock to make them increasingly efficient.

16.8 The heads of the Economy Cells should periodically meet and discuss among themselves the measures taken for economising the use of electricity. This way, they would be able to immensely gain from each others experience.

16.9 Similar effort should be organized at the level of the Railway Board.

\* The officials who bring about significant economies in other spheres as well should be given some recognition.



16.10 RDSO should be actively associated with the efforts being made by both the Zonal Railways and the Railway Board.

#### 17.0 Monetary savings.

17.1 As in the case of steam and diesel tractions, it is not possible here to precisely quantify in monetary terms the recommendations and measures suggested by us. What is possible for us at this stage is only to make approximations about the range of savings arising from the different devices and procedures recommended by us. These would, however, be a guide indicative of the trend and compass of the projected economics and would, therefore, be useful in appreciating the need for accelerated action. The savings would depend upon how fast the Railways are able to implement the decisions taken in this matter.

17.2 Broadly, the financial benefit, which may accrue to the system, is expected to be of the order of Rs. 40 crores per annum :—

	(Rs. in crores)
1. By improvement in power factor	5.8*
2. By better maintenance of track. improvements in operating and driving practices.	11.6**
3. By welding of rails, use of heavier track and improvement in the design of coaches and wagon.	11.6@
4. Use of Thyristor Chopper Control equipment.	5.8* @
5. Savings in energy consumption on general services.	5.0£
<b>Total</b>	<b>39.8 +</b>

#### 18.0 Conclusions.

18.1 The State Electricity Boards should not charge rates higher than those charged from the industrial consumers. The maximum demand charges should be computed on the basis of coincident demand of all the sub-stations served by a particular grid system. A comprehensive paper on these two disputed and other relevant issues should be prepared by the Ministry of Railways, for consideration and decision of the Committee of Secretaries.

18.2 We endorse the recommendations made by Rajadhyaksha Committee on Power that an expert group to be termed the Bureau of Electricity Costs and Prices

should be set up to lay down the norms for a practical and sound system of tariffs.

18.3 Urgent steps to improve the power factor should be taken. The commissioning of the bank capacitor at Manikui sub-station is being delayed. The technical problems should be overcome within a period of six months and the bank capacitor commissioned.

18.4 The Railways should undertake extensive trials to determine the sites where coasting boards should be installed for the guidance of the drivers. The drivers should be given appropriate instructions to adopt coasting technique to conserve fuel. This process should be completed within one year for the sides and diagonals of the quadrilateral which should be taken up on priority.

18.5 There should be no delay in installing the thyristor chopper equipment on EMU stock run on the suburban sections of Bombay Metropolis and proposed to run on the Calcutta Metropolitan underground system. The Railways should also study the adverse effects, if any, of the harmonics generated by this equipment on the signalling and telecommunication circuits. The entire process should be completed within 1 to 2 years.

18.6 RDSO should urgently make a technoeconomic evaluation of series capacitors to be used to overcome the problem of voltage drop in the OHE due to running of heavier freight trains. If the theoretical evaluation indicates that the installation of series capacitors would be of advantage to the system, these should be tried out on the representative sections of Eastern and Southern Railways. The entire process should be completed within twelve months.

18.7 The Railways should lay down norms of specific energy consumption for goods services also. Wherever the actual consumption varies widely from the consumption fixed as per the norms, detailed investigations should be carried out. Test checks of locomotives should also be made by installing meters on them to ascertain the health of the locomotives and to see if the motive power unit is functioning efficiently.

18.8 Energy consciousness should be developed amongst staff to avoid wastage of electricity by switching of the fans and lights whenever not required. Suitable control mechanism should also be developed by the Divisions to ensure that the instructions issued are implemented.

18.9 As in the case of steam and diesels, a full-fledged fuel economy organisation should be set up for electric traction as well.

\* The Study Group on Energy Consumption had worked out that by improving power factor, saving to an extent of 4 to 5 per cent of the electric energy bill would accrue as a result of reduced payment of maximum demand charges and elimination of low power factor surcharge. 5 per cent of the current bill would be about Rs. 5.8 crores.

\*\* The practice of coasting alone can result in reducing the consumption of electricity by about 5 per cent. Other measures such as better maintenance of track, less number of out-of-course stoppages can account for another 5 per cent. 10 per cent of the current bill of Rs. 116.25 crores would amount to Rs. 11.6 crores.

@ In the preceding Chapter on Diesel Traction, an economy of 10 per cent was considered as possible. The same norm has been adopted here too. This saving would, however, be realised in stages depending upon the progress of welding of rails and improvements in the design of coaches and wagons.

\*@ Thyristor Chopper Equipment when installed on the EMU motor coaches will have a possibility to save electric energy to an extent of 20 per cent on the EMU services and the underground metro systems. The electricity consumption on EMU services is about 25 per cent of the total electricity consumption on traction. The bill for the electricity consumption on EMUs may, therefore, be of the order of Rs. 29 crores (1/4th of Rs. 116.25 crores), 20 percent of Rs. 29 crores is Rs. 5.8 crores.

£ This would be roughly 10 percent of the current bill on electric consumption on general services. (This level of saving has been achieved in Rail Bhavan).

+ This does not include savings due to rationalisation of tariff structure. The extent of savings in this area depend upon the decision taken by the Committee of Secretaries and the extent to which this decision is implemented by the State Electricity Boards.



18.10 While it is not possible to accurately Quantify in monetary terms the recommendations made by us, broadly the saving that the system would derive would be of the order of Rs. 40 crores per annum.

*Annexure A 5.1*

(Cf. Para 2.11)

**Working Group on Railway Electrification.**

- |  |           |
|--|-----------|
| 1. Shri Prakash Narain, Adviser (Transport), Planning Commission.  | Chairman. |
| 2. Shri S. Babbar, Manager, Corporate Planning, N.T.P.C., Nehru Place New Delhi  | Member    |
| 3. Shri G.P. Dodeja, General Manager (TSG), B.H.E.L., 6th Floor, Integrated Office Complex, Lodi Road, New Delhi-110003.         | Member    |
| 4. Shri G.K. Kanchan, Jt. Director (Traffic Research) Railway Reforms Committee, Lok Nayak Bhavan (9th Floor), New Delhi-110003. | Member    |
| 5. Shri Ashok Malhotra, C.F.T.S., Northern Railway, Baroda House, New Delhi.   | Member    |
| 6. Dr. S. Ramesh, Jt. Secretary, Ministry of Energy, New Delhi.  | Member    |
| 7. Shri A.A. Sahay, Addl. Director (Railway Electrification), Railway Board, New Delhi.  | Member    |
| 8. Shri K. Venkataraman, Director, Central Electricity Authority, Sewa Bhavan, R.K. Puram, New Delhi.                            | Member    |
| 9. Shri K.S. Sharma, Joint Director (Electrical Engineering) Railway Board, New Delhi.   | Convenor  |

**Terms of reference.**

- (i) to assess the progress of electrification taking into account the programme included in the Sixth Five Year Plan and projected for the Seventh Five Year Plan;
- (ii) to formulate a strategy and programme for accelerated electrification of the Indian Railway System in the background of the energy crisis and the need for movement of throughput in both passenger and freight traffic;
- (iii) to update the cost data for electrification subsequent to formulation by the Raj Committee on Railway Electrification including break-even point between electric and diesel traction

and work out a programme for routewise distribution of dieselisation and electrification during the 6th, 7th and 8th plans and quantify the requirement of locomotives to meet the said distribution;

- (iv) to broadly estimate the financial resources necessary for accelerated need based programme of electrification in 6th, 7th and 8th plans;
- (v) to work out a programme of a unified system of traction on electrified routes and in that context quantify the requirement of electric/diesel shunters for electrified routes and also develop a programme for manufacture/ procurement of such shunters;
- (vi) to suggest structural changes in the organisational set up to achieve the targets envisaged;
- (vii) to consider the role of electrified railway services in passenger transport including metropolitan areas;
- (viii)\* to suggest measures necessary to ensure reliable power supply at an economic tariff for Railway traction;
- (ix) to suggest measures to ensure reliable and adequate supply of equipments and material for electrification programme; and
- (x) to suggest modern methods of construction with a view to improving the rate of electrification.

*Annexure A 5.2*

(Cf. Para 2.14)

**MOST IMMEDIATE**

No. 27/43/82-SEB  
Government of India  
Ministry of Energy  
Deptt. of Power

New Delhi, the 23rd May, 1983.

**OFFICE MEMORANDUM**

**Subject.**—Rationalisation of tariff rates offered by the State Electricity Boards to the Indian Railways.

The undersigned is directed to refer to Railway Reforms Committee letter No. 81/RRG/WG(14)/RE, dated the 16th October, 1982, on the subject cited above and to forward herewith the comments of the Department of Power on the recommendations of the Working Group.

Sd/-  
(G.L. JERATH)  
Desk Officer

To

Railway Reforms Committee  
Ministry of Railways  
(Shri A.P. Chopra)  
Additional Director Finance & Costing  
9th Floor  
Lok Nayak Bhavan  
New Delhi.

\* The tariff structure was examined Working Group under this term of reference.



**Statement showing the observations/Recommendations of the working Group of Railway Electrification and  
Comments of Department of Power**

**Recommendations of the Working Group.****Comments of the Department of Power.**

1. The group recommend that Electricity Boards should provide traction supply at 66/132 KV at the sub-stations owned by Railways from their transmission lines and Railways should not lay transmission lines for this purpose except in circumstances, where such a course is unavoidable.

While it would be appropriate that the transmission lines at 66 KV and above for giving power supply to the sub-stations of the Railways should be constructed by the State Electricity Boards, the issue of meeting the capital costs of these lines extended from the sub-stations of the SEBs to meet solely the requirements of the Railways will be resolved between the SEBs and the Railways on the basis of the prevailing Rules and Regulations of the SEB. This is irrespective of the dedicated transmission lines which the Railways might have to construct interconnecting the sub-stations of the Railways.

2. The Group has considered the question of captive power arrangement for Railways. Even though the need for reliability and independence of system from disturbances and shortages experienced in supply from Electricity Board favours captive generation by Railways, yet in view of the following disadvantages, the Committee do not consider captive generation as an optimum solution :—

(i) Traction loads are widespread and are relatively small at each point of injection. Therefore, Railways will need several small power stations along the track.

(ii) Since each power station will need a standby, from reliability considerations, the reserve margins will be very high.

(iii) As result of high reserve margins, cost of generation will be excessive.

(iv) Further since dedicated transmission lines, have not been provided for reasons stated earlier, such captive plants would have to be connected to state grid and power wheeled through their system to the injection point, thus leaving the control to SEBs again.

For the last many years this matter has been receiving considerable attention of the Railway Board as well as of the Department of Power. It has been the Term of Reference of two Committees—One headed by Dr. Tata Rao in 1973 and later a Two-man Committee consisting of representatives of Railway Board and Central Electricity Authority. Both these Committees recommended setting up the Railways of two or three captive Power Plants on the main Electrification Routes. Department of Power, in letter No. 30/2/80-DO. VI, Vol. I, dated 25th May, 1982 from the Energy Minister to Railway Minister have recommended to the Railways to give serious thought to setting up of one or two captive Power Stations in critical areas. The specific proposals from the Railways in this regard would be considered on merit by the Department of Power within the framework of the overall policy laid by the Cabinet on the establishment of Captive Power Plants. In association with these captive plants Railways could also consider construction of some dedicated transmission lines to the captive sub-stations along the electrification routes.

3. With a view to ensure uninterrupted supply for traction the Group recommend that release of the unallotted capacity from the Central Sector power generation projects like NTPC and NHPC to the deficit States, may be given on priority to the Railways to their agreeing that power supply shall not be curtailed to the Railway for traction. To ensure that this does not lead to States staking perpetual claims on the unallotted capacity from Central sector power generation Projects, it is recommended that implementation may be made by Department of Power through the Central Electricity Authority.

The Department of Power do not agree with the Recommendation that Railways should be given direct allocation from Central Thermal Stations as it is not feasible to supply power direct to any consumer from a Central generating station. The primary responsibility for meeting the power needs of the different categories of consumers has been and continues to be with the State Electricity Boards. The Central Sector Power Projects are intended as a supplement to the State effort and is really in the nature of plan assistance in kind. Also there were similar requests made by other public sector undertakings like steel, aluminium etc., which were not acceded to. If an exception is made for the Railways, similar demands would come from other public sector undertakings and a situation may arise when the States will gradually disown responsibility for supply to Central Public Sector Undertakings.

4. Group recommends that the tariff to the Railways should be rationalised after taking into consideration the unique characteristics of traction load and

The Working Group has observed that Railways contribute to the system improvements as their demands have a high load factor and they do not get the benefit



the importance of transportation in the economy of the country. The High load factor of traction loads and constant demand during entire 24 hours including night, are unique characteristics which should be reflected in the tariff offered to the Railways.

in the form of concessional tariff as compared with the industries. This reasoning is not correct as there are many power intensive industries which also contribute towards the base load and higher power factor to the supplier's system. Also it has been ascertained from field studies by the CEA that while in the heavy density suburban section of the Railways the load factor is of the order of 55% to 60% on main lines i.e. other than suburban sections, the load factor is of the order of 25% to 35% only. The contention of the working group that Railways have a high load factor does not appear to be correct.

5. The energy charges component of two parts tariff offered to Railways should not be higher than that applicable for industrial consumers.

This recommendation is in order.

6. On account of continuous demand throughout the day and the maximum demand reflected on grid system being the coincident demand of all the sub-stations, the chargeable maximum demand should be computed on the basis of coincident demand of all the sub-stations in a particular State.

We do not agree with the contention of Railways. Railways avail of supply at different points and the effects of railways demands will be different on individual power feeders. The Boards, are, therefore, right in basing demand charges on the maximum demands at the individual points of supply.

7. Maximum demand charges are required to be fixed rationally on the basis of the capital cost of generating plants and transmission and distribution networks. The cost of generating plants depend upon the peak demand which the power station is supposed to meet. In case of Railway traction loads, it is the coincident maximum demand that is required to be met by the generating stations and not the arithmetical sum of the maximum demands at each sub-station. The Capital cost of transmission and distribution network is a function of reliability level required. It is considered that the Electricity Board has to invest some additional amounts in transmission and distribution network by way of providing required redundancy in the system to ensure reliability and meet maximum demands at each sub-station. The incremental cost for providing additional redundancy in the transmission and distribution network could be built in by State Electricity Boards by way of suitable provision in the tariffs. It is, therefore, felt that the maximum demand charges in a case of Railways could be slightly more as compared to industrial consumers. The exact extra charges for maximum demand on this account could be worked out in each individual case relating the same to additional investments made by Electricity Boards.

The maximum demand charge in respect of individual points has been dealt with against Item 6 above. In regard to provision of additional redundancy in transmission system to meet the requirement of Railways for better reliability, the recommendations of the Working Group for providing extra in the Maximum Demand charge is rational and is hence agreed to.

8. An independent body with statutory status under Department of Power should be set up for arbitration of disputes between Railways and SEBs on reasonableness of tariff. If necessary, the existing statutes may be amended to give effect to this recommendation.

Regarding the setting up of an independent body of settlement of disputes on tariff with statutory status under the Department of Power, such as Bureau of Electricity Costs and Prices (BECPP), the Committee on Power has already made such a recommendation which has been circulated to the States for their views. Such a step would require amendment of the Electricity (Supply) Act which requires prior consultation with the States. Even though the process has been set in motion for the recommendation of the Committee on Power, the prospects of its going through are not encouraging. In any case, it would be difficult to set up such a body for one type of consumer only.



## CHAPTER VI

### ECONOMY IN STAFF EXPENDITURE : PRODUCTIVITY

#### 1.0. Introduction.

1.1. The Railways are the largest single employer in the country. As on 31 March, 1982 they had a staff strength of 15.7 lakh regular employees, over the Zonal Railways, the Railway Board, the Production Units and on construction work.

1.2. Table 6.1 below gives at a glance the strength of railway employees under various Groups, together with the cost, for some years beginning from 1950-51.

**Table 6.1**  
**Strength of staff and cost**

Year	Number of staff as on 31 March (in 000)				Cost* (Rupees in crores)
	Groups A & B (Officers)	Group C (Class III)	Group D (Class IV)	Total	
1950-51	2.3	223.5	687.8	913.6	113.8
1955-56	2.7	373.3	648.8	1,024.8	148.2
1960-61	4.4	463.1	689.5	1,157.0	205.2
1965-66	6.6	550.7	795.0	1,352.3	310.4
1968-69	7.5	562.4	784.0	1,353.9	393.3
1973-74	8.8	622.4	801.0	1,432.2	570.7
1976-77	9.2	650.5	814.7	1,474.4	924.4
1977-78	9.5	662.9	822.5	1,494.8	962.1
1978-79	9.9	686.9	828.2	1,525.0	1,035.8
1979-80	10.5	707.4	832.5	1,550.4	1,154.8
1980-81	11.2	721.1	839.9	1,572.2	1,316.7
1981-82	11.6	728.4	835.0	1,575.0	1,451.5

1.3. The employment level had risen at the rate of 3.2 per cent per annum during the first 15 years upto 1965-66 but slowed down subsequently to 1.03 per cent per annum. The above table also shows that the Gazetted cadre constitutes 0.7 per cent of the total strength, Class III employees 46.3 per cent and Class IV staff 53.0 per cent. Over the years there has been a relatively larger rate of increase in the number of officers mainly on account of redesignation of doctors in Group 'C' as officers in Group 'B' and upgradation of certain posts from Group 'C' to Group 'B' mainly in an effort to break the prevailing stagnation in cadres.

1.4. The discipline-wise break-up of staff for the years 1979-80 to 1981-82 is given in Table 6.2 below :

**Table 6.2**  
**Strength of staff : discipline-wise**

Department	1979-80	1980-81	1981-82
Administration	42,119	43,187	44,053
Accounts	31,233	31,607	31,713
Engineering	315,447	321,107	323,199
Signal & Telecommu- nication.	60,126	62,006	62,779
Transportation	204,006	205,235	203,766

\* 1. The Group-wise average annual cost per employee is given in Annexure A-6.1,

2. The break-up of the annual wage bill under pay and leave salary, running allowance, overtime allowance etc. since 1979-80 is given in Annexure A-6.2† Figures

Department	1979-80	1980-81	1981-82
Commercial	118,889	119,909	120,488
Mechanical Engineering	491,869	496,577	492,028
Stores	41,545	42,416	42,682
Electrical	118,018	120,907	124,043
Medical	53,654	54,167	55,582
Railway Protection Force	61,493	61,852	61,587
Railway Board and other attached Rail- way offices.**	11,961	13,184	13,660
<b>Total</b>	<b>1,550,360</b>	<b>1,572,154</b>	<b>1,574,980</b>

1.5. Bulk of the staff are thus employed in Civil Engineering ; Transportation and Commercial; and Mechanical Departments. These three departments alone account for 72 per cent of the total staff.

1.6. In addition to the regular staff, the Railways employ casual labour on Construction Projects and on works which are seasonal, intermittent or extend over short durations. They are mostly in unskilled categories. The strength of casual labour during the period 1972 to 1982 is given in Table 6.3 below.

**Table 6.3**  
**Casual labour : strength**

Year	Number (in lakhs)
1972	3.34
1973	3.16
1974	2.74
1975	2.41
1976	2.44
1977	2.36
1978	2.42
1979	2.29
1980	2.31
1981	2.60
1982	2.30

Source : Obtained from Railway Board.

1.7. We have already projected in Part II of our Report† on Transportation that the goods traffic to be carried by the Railways would lie somewhere between 375 and 413 billion net tonne kilometres approximating to an originating tonnage of 585 to 664 million tonnes. This is roughly two-and-a-half times the present level of traffic. The suburban and non-suburban passenger traffic, by the turn of the century would be of the order of 280 billion and 160 billion passenger kilometres respectively, i.e. over twice the level of the traffic now being carried. To handle this very large growth of traffic, we had estimated in Part IX of our Report‡ on Personnel that the staff strength on Railways may well exceed 27 lakhs.

in parentheses in this Annexure denote percentage of staff costs to the total working expenses.

\*\* Excluding Metropolitan Transport Projects.

Source. —Annual Statistical Statements (Statement No. 40).

† Cf. paras 5.3, 6.8 and 10.5 of Chapter I.

‡ Cf. para 1.1 of Chapter I



1.8. The Railways cannot certainly afford to have such a large number of men on their rolls and still hope to be a viable and manageable organisation. They have clearly no option but to shed the existing outmoded technology which only leads to stagnation in the productivity of manpower. If the Railways have to continue to remain in business and provide an efficient and economic mode of transport, they would essentially have to take to technology-upgradation, improve their operating and maintenance practices and introduce modern management techniques to regulate the staff strength.

1.9. In this Chapter we would briefly discuss the trend of productivity of staff on the Indian Railways and how low it is in comparison with that on the railway systems abroad.

1.10. The expenditure on pay and allowances of the regular railway employees for 1981-82 was Rs. 1,451 crores and formed 45.6 per cent of the total working expenses.\* Once, therefore, we are able to tackle this issue, about half of the total working expenses would be covered.

## 2.0. Productivity.

2.1. Some of the Railway systems abroad have achieved much higher productivity in comparison to the Indian Railways; the number of men employed by them per unit of traffic output is much less. Table 6.4† gives the quantum of manpower employed by some of the railway system *vis-a-vis* the traffic carried by them.

Table 6.4.  
Manpower *vis-a-vis* traffic carried 1979-80

Name of the Railway	Traffic Units (Millions)		Number of employees
	Net tonne kilometres	Passenger kilometres	
Chinese National Railways.	570,732	138,037	1,535,400
French National Railways.	70,908	54,251	254,400
Japanese National Railways.	42,975	197,682	420,815
Soviet Railways	3,350,000	332,100	2,031,200
Indian Railways	155,995	198,642	1,550,360

Source.—(i) International Railways Statistics 1980.  
(ii) JANE's World Railways 1980-81.

2.2. Thus, when compared to the Indian Railways, Soviet Railways carried about twentyone times the goods traffic and 1.6 times the passenger traffic though they had only 31 per cent extra staff. Chinese National Railways employed almost an equal number of employees but carried 3.6 times the goods traffic and 0.7 times the passenger traffic. As for the Japanese National Railways, though their manpower is only 27 per cent of that on Indian Railways, they carry an equal amount of passenger traffic and 27 per cent of the goods traffic handled by the Indian Railways.

2.3. There are differences between our Railway system and those abroad, inter alia, in matters relating to the technology used, the extent of automation and the working environments. However, the experience of some of the important Railways abroad is a pointer to the possibilities for the future and does indicate that a vast scope exists for the Indian Railways to raise the productivity of their men. It is futile and defeatist to brush away all accretions in the productivity of the system and the productivity per worker brought about on other Railways always pointing to the environmental and situational differences between them and us.

2.4. The writings on the wall are clear. The anticipated growth in traffic has to be dealt with much-less-than-proportionate rises in both personnel and rolling stock. This is possible only by catapult-increases in the productivity of both the average railwayman and the system.

2.5. Table 6.5 gives the staff strength *vis-a-vis* the traffic carried by the Indian Railways during the period 1976-77 to 1981-82.

2.6. While the staff strength in the period 1976-77§ to 1981-82 increased by 5.6 per cent, wagon kilometres increased only by 2.7 per cent and vehicle kilometres by 5.2 per cent despite some technological advances and improvements in equipment.

Table 6.5  
Manpower *vis-a-vis* traffic carried

Year	Total staff strength				Wagons kilometres (In millions)	Index	Vehicle kilometres (In thousand)	Index
	Excluding casual labour (In thousands)	Index	Including casual labour (In thousands)	Index				
1976-77	1,474	100.0	1,710	100.0	13,065	100.0	5,910	100.0
1977-78	1,495	101.4	1,737	101.6	13,299	101.8	6,187	104.7
1978-79	1,525	103.4	1,754	102.6	12,501	92.6	6,136	103.8
1979-80	1,550	105.1	1,781	104.2	12,194	93.3	6,215	105.1
1980-81	1,572	106.6	1,832	107.1	12,165	93.1	6,189	104.7
1981-82	1,575	106.8	1,805	105.6	13,416	102.7	6,217	105.2

Source.—Annual Report and Accounts (Statistical Summary).

\* Inclusive of appropriations to the Depreciation Reserve Fund and the Pension Fund.

† Also of para 3.4 of Chapter III of Part VIII of our Report on Research and Development.

§ The base year 1976-77 has been deliberately chosen as this was one of the best years of performance by the Railways.



During this period, the Railways added assets worth Rs. 2,552† crores. Clearly, therefore, the productivity of staff on the Railways significantly declined during this interval.

### 3.0. Low productivity : reasons for.

3.1. One of the main reasons for low productivity is that Class IV staff account for 53 per cent of the total strength. This clearly signifies the poor state of technology and the management's reliance on obsolete and archaic procedures and practices.

3.2. All over the world it has been the experience that with greater modernisation, automation and application of latest management techniques, the ratio of unskilled men to the total labour force has come down sharply. Though in our Railways too, this is manifest, to some degree, in diesel and electric traction, the tendency to carry on with the erstwhile staff even after little bits of modernisation that has taken place seems to be rather deep-seated.

3.3. In order to handle the growth of traffic expected by the turn of the century, the Railways have no other alternative but to quickly fill the technological gaps precipitated by inept performance in research and development.† They will have to modernise their system, induct improved operational maintenance practices, revamp and streamline the office procedures and increasingly apply the latest management techniques. The alternative to this choice would be to allow a run-away growth of assets and manpower, which clearly is to be ruled out.

3.4. Once the system gets modernised, there would be higher demands on skill and expertise, resulting in continuous reduction in the strength of unskilled staff. We have in this regard already mentioned\* that not more than 20 per cent of the total non-gazetted posts should be held in Class IV or unskilled categories.

3.5. Furthermore, we find that the Railways are encumbered with complex and involved procedures that cause delay and obstruct clear thinking or timely decisions; information is compiled by an army of men but is neither available in time nor guaranteed against error. Only when these procedural delays and errors are eliminated and information gathering speeded up that the productivity of the ministerial staff would get substantially raised. Two things are, therefore, necessary : simplification of rules and procedures and mechanised information gathering and record keeping.\*\*

3.6. There needs to be a change in the approach towards the support organisation of senior officers. It would be better if instead of having a number of personnel assistants, and peons, more advantage is taken of modern facilities like intercoms, dictaphones, photocopy machines, filing systems etc. This way it should be possible to reduce manpower in the offices and simultaneously improve the service capability of the organisation.

3.7. We recommend that an expert group should be set up to examine this issue in detail and lay down norms

for the support organisation of officers at various levels, to be uniformly applied all over the Railways.

### 4.0 Personnel Management.

4.1. The inputs by way of advanced technologies, modernisation of plants and machinery, operational and maintenance practices would undoubtedly make a considerable impact on the productivity of the system, but if the Railways have to modernise truly, they will have to give greater recognition to the importance of vast human resource at their command. It has to be appreciated that the man behind the machine has become the central focus of modern management.

4.2. Personnel management on the Indian Railways has left much to be desired. In Part IX of our Report on Personnel, we have indicated some of the reasons which have caused the vast numbers of railwaymen to be disaffected: a complex and vast organisation governed by obfuscating rules that are applied unimaginatively; lack of adequate training and development to match the needs of a rapidly modernising organisation; lack of grievance machinery; lack of career planning and prospects and certain elementary facilities such as housing, education of children etc. Taken together these have resulted in an oppressive milieu that has vitiated the working of the organisation.

4.3. We have analysed in the same Report the issue of personnel management in all its ramifications : manpower planning keeping in view growth and modernisation, suitable changes in recruitment procedure to improve the system of selection and the quality of recruits, comprehensive training to the staff using all available facilities and, where necessary, creating more and better facilities, rationalising industrial relations, giving a forward-looking and vigorous thrust to the personnel department, measures to improve career prospects of staff and officers and finally measures to bolster the sagging morale of railwaymen.

4.4. We firmly believe that no further time should be lost in redeeming the situation and that the Railways should consider and implement forth-with the suggestions made by us in our Report on Personnel. It should be appreciated that the staff can be creative at work only if properly motivated. It should be the responsibility of the Railway Managers to develop the human resource at their command they should take positive action to create an organisational climate conducive to human growth. It should be an essential task of the management to devote time to nurture the leadership potential and promote motivation, morale climate, commitment to objectives, problem solving skills of the people they manage. We are confident that the responsible recognised trade unions would render their cooperation in the task.

### 5.0. Views of RTEC 1980.

5.1. We have gone through with interest the observations made by the Rail Tariff Enquiry Committee (RTEC) June, 1980. These have been attached as an Annexure.@

‡ Total Investment	(In crores of Rupees)
As on 31 March, 1982	7,906.8
As on 31 March, 1977	5,354.5
Difference	2,552.3

Source.—Explanatory Memorandum, Appendix VII.

\*† Cf. Part VIII of our Report on Research and Development.

\*Para 2.4, of Chapter VIII of Part IX of our Report on Personnel.

\*\* Also Cf. Para 4.2, Chapter VII of our Report on Personnel (Part IX).

§ Several recommendation in this regard have been made in our earlier Reports regarding introduction of modern methods of track maintenance; movement of bulk commodities in block rakes; bypassing of intermediate yards; development of terminal capacity; modernisation of workshops, traction and signalling etc. The need for increasing the manpower would be less to the extent these recommendations are implemented.

£ Cf. paras 1.162, 1.175 and 1.176, Final Report.  
@ Annexure A-6.3.



5.2. Briefly, RTEC have made the following observations :—

1. Indian Railways have some of the best potential talents to ensure improved operation and incessant development of the railway system. Such talents need to be nurtured and developed.
2. This is the responsibility of effective personnel management to isolate the brilliant from the rest and provide opportunities for the development of the former towards the greater good of the system.
3. Personnel is the ultimate source of strength of the organisation, and neglect of the same would only bring about dilution of the system.
4. The history of Indian Railways is strewn with this instances of strifes between management and labour, and has been a long story of strikes go-slows and tool or pen-down operations. The labour is controlled not only by recognised unions but also by unrecognised ones.
5. There is need for a positive improvement in labour relations on the Indian Railways. This is dictated, if not by other considerations, by the magnitude of the infrastructure itself.
6. The Railways cannot be expected to move in isolation and therefore, they are not immune to the socio-political fall out from the rest of the social milieu.
7. Nevertheless, a firm, forthright and congenial labour-relation policy has to be pursued.

5.3. We generally endorse the views of this Committee and recommend that the Railway executives develop and display a much greater ability to get along with the staff. Today a large majority of the managers agree that this ability is more vital than intelligence, decisiveness, knowledge or job skills.

5.4. At the same time, an air and attitude of wanton submissiveness to labour unrest would do no one any good. While the welfare and grievances of the worker should be remedied, and managers should have their fingers on the pulse of labour, firmness and forthrightness in dealing with labour problems would be equally important.

#### 6.0. Productivity norms.

6.1. The Railways have presently no suitable norm to measure productivity of their greatest asset the human resource. As brought out by us in Part IX\* of our Report on Personnel, two attempts to establish productivity-linked incentives have so far been made; workshop incentive bonus scheme and productivity-linked bonus.

6.2. We have already brought out that the workshop incentive scheme has become increasingly ineffective in achieving its aim. This scheme affected quality and gave rise to wide-scale malpractices. We have accordingly recommended setting up of an expert group to suggest ways and means for workshop performance to be more realistically linked with the incentive bonus. We hope that the Expert Group has since been set up.

6.3. As for the productivity-linked bonus for railwaymen, the formula as it exists today has little relationship with real productivity: it does not take into account inputs by way of additional assets, technological changes, increases in the number of staff, etc. The most damaging feature of the formula is that the bonus payment to each worker remains unchanged even if the output remains constant though the number of staff goes on increasing and the Railways keep on pumping assets worth crores of rupees into the system.

6.4. In a situation like this, the total bonus payments made by the Railways would be larger even though they would be considered less efficient because they would carry the same amount of traffic with larger strength of staff and larger number of assets in the system. The existing formula, therefore, needs to be urgently reviewed. It is obvious that it must be linked to and dependent upon variations in productivity.

#### 7.0 Development of multi-skills.

7.1. We have already stated† that the coach attendant should be given multi-disciplined maintenance training and should carry simple tools that would enable him to attend to minor defects in doors, windows, electrical fittings, plumbing etc. This would do away with the practice of maintenance staff accompanying mail and express trains.

7.2. In a vast and wide spread organisation with, numerous small establishments such as the Railways, there is a good deal of scope for manpower reduction by establishing a workforce of skilled workers capable of handling more than one trade. By way of illustration, the work of carpenters, painters, fitters and electricians could be managed by a smaller number of skilled men than at present provided that they are adequately trained for multi-skills.

7.3. We recommend that the concept of developing multiskills should be given serious consideration and wherever possible extended to semi-skilled categories as well. To add to the productivity of skilled workers, they should be provided with light and portable tools and wherever they have to cover long distances, they may be provided with bicycles.

#### 8.0. Analysis of important activities.

8.1. Connected with transport services, the Railways undertake numerous activities on some of which a large body of railwaymen are engaged.

8.2. These important and major activities should be identified by the Railways and analysed in detail as under.

1. Purpose.
2. Consequences of not performing the activity.
3. Measure of performance norms/yardsticks.
4. Alternative ways of performing the function.
5. Cost and benefits of the alternatives.

8.3. Such an analysis would be of immense help to the management in knowing whether an activity or a part thereof has become redundant with the passage of

\* Cf. para 3.0 of Chapter IX.

† Para 31.1, Chapter III of Part V of our Report on Production and Maintenance of Rolling Stock.



time or as a result of automation, modernisation etc. The areas where the existing norms have to be revised, will also be thrown up. By way of example, with the Railways now taking to modernisation of workshops and production units, the labour content must go down.

8.4. We are told that often it happens that while the staff are provided based on specific items of work to be done. In actual practice they attend to only critical items, leaving out the rest. We recommend that there should be a suitable machinery to monitor this, and if it is felt that it is not necessary to attend to some of the items of work in a particular activity, the sanctioned strength of staff should be curtailed.

#### 9.0. Cells on Industrial Engineering.

9.1. We have already recommended\* setting up of industrial engineering cells in each workshop to ensure cost-effectiveness, quality consciousness, and continuous updating, of technology and methods. We have also stated that industrial engineering can be applied to almost all forms of activity, whether it be operations, commercial systems, personnel management, or other similar activities.

9.2. It is our understanding that most of the areas of railway working have not been exposed to the concept of industrial engineering. Industrial Engineering Cells, as of today consisting, of a few semi-qualified men, may be existing at scattered locations, but their output is small due mainly to lack of qualified personnel and indifference on the part of senior officials.

9.3 Detailed work studies and method improvement studies will need to be conducted by qualified personnel appropriately trained and experienced in Industrial Engineering and management control. Such technical scrutiny will need to be introduced in all activities of the Railways in order to focus attention to those areas where substantial redundancies can be identified and work managed with less staff with marginal capital inputs.

9.4. The present moribund work-study activities on the Railways need to be reactivated. Instead of having a miniscule work-study cell hidden some where in the Headquarters of a Zonal Railway Industrial engineering Cells with competent and qualified personnel should be set up in each department and constellation of activity. Such cells should work under the personal direction and supervision of the respective Head of Department, so that the recommendation made by these cells are pragmatic and their physical implementation poses no problems.

9.5. The recommendations made by these cells should be forwarded to other zonal railway for their consideration and application.

#### 10.0. Conclusions.

10.1. It is a matter for concern that the productivity of staff on Indian Railways has been on a steady decline for quite some time.

10.2. This is perceptibly low as compared to productivity of staff on railway systems abroad. Even accounting for significant differences between the systems it is apparent that there is substantial scope and necessity for raising the productivity of personnel on our railways.

10.3. The out dated technology and overwhelming reliance on archaic practices and procedures are the

principal factors leading to low productivity. It is essential that urgent and objective steps are taken to upgrade technology, improve operating and maintenance practices and adopt modern management techniques.

10.4. The Railways would need to pragmatically take to such a strategy to enable the organisation to handle the prolific anticipated growth in rail-borne traffic by much-less-than-proportionate rise in staff strength and rolling stock.

10.5. Once the technology gets both uprated and updated and modern procedures and practices integrated into the system, the percentage of unskilled and class IV staff to the total strength of staff ought to come down steadily. There would then be much higher resort to skill, experience and competence. Quality rather than quantity would be the guiding criterion in the deployment of personnel.

10.6. There should be a change in the approach towards the support organisation of senior officers. Instead of their having a number of personal assistants, and persons they should be provided with modern facilities, like intercoms, dictaphones, etc. This would reduce manpower and at the same time, streamline the work to make the whole operation much more efficient. An expert group should be set up and norms laid down for all levels of officers, to be uniformly applied all over the Railways.

10.7. The importance of the man behind the machine needs to be properly and adequately appreciated. Management should nurture and develop the potential for leadership with proper motivation and efflorescence of morale and involvement.

10.8. An adequate machinery for redressal of grievances of the staff at all levels should be activated.

10.9. While the legitimate grievances of staff should be quickly removed, it would be equally important to uphold firm and forth right handling of labour unrest.

10.10. There is a vast scope for manpower reduction by establishing a work force of skilled workers capable of handling more than one trade. To add to their productivity, the workers should be provided with light and portable tools and bicycles, wherever long distances have to be covered.

10.11. The Railway should analyse important and major activities to determine if any activity or part of it has, with passage of time or because of modernisation etc. become redundant and whether any cheaper alternative way of performing the activity exist.

10.12. The management should ensure that the items for which the staff have been provided are actually carried out. If some items of work are not necessary there should be a commensurate reduction in the staff strength.

10.13. Industrial engineering technique should be applied to all forms of activity, whether it be operations, commercial systems, personnel management or other similar activities. Industrial Engineering Cells, with competent and qualified personnel, should be set up in each department and constellation of activity and work under the personal direction and control of the respective Head of the Department. The recommendations of these cells should be forwarded to other Zonal Railways for their consideration and application.

\* Para 24 of Chapter II of Part V of our Report on Production and Maintenance of Rolling Stock.



Annexure A-6.1

Cf. Para 1.2,

## Average annual cost per employee

(Rupees in thousands)

Year	Groups A & B	Group C			Group D			All the groups taken together
		Workshop & artisan staff	Running Staff	Others	Workshop & artisan staff	Running Staff	Others	
1	2	3	4	5	6	7	8	9
1979-80	26.1	8.4	12.5	10.4	5.3	8.7	5.3	7.6
1980-81	28.1	9.7	13.5	11.7	5.8	9.7	5.7	8.3
1981-82	30.8	10.5	15.3	12.7	6.3	11.4	6.2	9.2

Source.—Annual Statistical Statements (Statement No. 40).

Annexure A-6.2

(Cf. Para 1.2.)

## Break-up of Wage Bill

(Amount in crores of Rupees)

Year	Pay & Leave Salary	Running Allowan- ces	Overtime Allowan- ces	Dearness Allowan- ce & Value of Grainshop Conces- sions	Other Compensatory Allowances		Producti- vity linked bonus	Total wages (2 to 8)
					Depend- ing on area of work	Not depend- ing on area of work, (excluding Travelling Allowance)		
1	2	3	4	5	6	7	8	9
1979-80	606.4	31.2	18.1	294.5	39.5	9.3	35.0	1,033.9
1980-81	642.1	32.4	22.1	367.2	42.8	10.8	47.9	1,165.3
1981-82	649.4	37.0	23.8	461.9	44.2	11.5	54.5	1,282.3

Years	Travelling Allowances	Compen- sation under Workman's Compen- sation Act	Rewards etc.	Hard Duty Allowance	Provident fund Con- tribution	Gratuity or special contribution	Pensionary Benefits		Grand Total	Total Working Expenses
							Pension	Gratuity		
	10	11	12	13	14	15	16	17	18	19
1979-80	25.2	0.9	0.3	0.04	14.3	5.8	49.7	24.5	1,154.8 (53.9)	2,142.4
1980-81	28.0	1.0	0.4	0.07	12.6	6.4	69.5	33.4	1,316.7 (51.9)	2,536.5
1981-82	28.1	1.0	0.3	0.07	11.5	5.6	84.8	37.2	1,451.8 (45.6)	3,182.1

Figures in parentheses denote percentages of staff costs to the total working expenses.

Source.—Annual Statistical Statements (Statement No. 40).

Annexure A-6.3  
(Cf. para 5.1.)

## Extracts from RTEC's Report

"Our observations and discussions have given us sufficient confidence that the Indian Railways have some of the best potential talent to ensure the improved operation and sustained development of the railway system. This however requires a much more systematic effort than

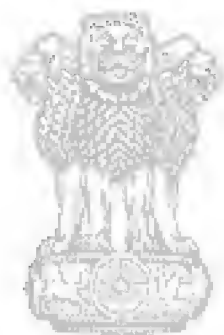
is in practice today for talent-hunting and the development of potential talent. Capabilities of different individuals even in the same service lie in different directions, and their potentiality to develop also varies. The task of effective personnel management is to distinguish between different individuals & ensure that proper opportunities-training of different kinds and experiences through appropriate postings both within and outside the organisation—are given to different individuals so that their potentiality is fully developed and appropriately utilised.



Personnel is the ultimate source of the strength of an organisation and the neglect of this major resource can be a major handicap to its efficient functioning. It cannot be said that adequate attention has been paid in the Indian Railways to this aspect.

"It is not necessary for us to State that, whatever the situation regarding the welfare measures taken by the Railways and however long the history of attempts of co-operation between the railway organisation and its employees, it cannot be said that the relations are satisfactory, and this is undoubtedly one of the major factors affecting the efficiency of the Indian Railways. Not only are there a number of strike of different duration, by different categories, and in different parts of the country but there have been a number of situations of go-slow and lack of co-operation. The railway labour is organised mainly under the auspices of two major National Federations, and, in addition, there are a number of category-wise associations and other unrecognised bodies. These latter pose special problems which need attention.

"There is no doubt that labour relations on the Indian Railways need to be improved and, unless this can be done, other efforts to improve efficiency are not likely to be very effective. As indicated earlier, however, railway labour constitutes such a large proportion of the labour force in the country, and it is spread over such a wide area, that to a large extent labour relations in the Railways depend a great deal on labour as well as social relations in the economy and the society as a whole. Political agitations of different kinds, regional or linguistic differences, the class relations among different sections of the populations, all these affect labour relations in Railways a great deal and the Railways cannot isolate themselves from what happens in the economy and the society as a whole. This is not to say that the Railway Administration should not or does not make efforts to improve labour relations and build up morale within the Railway organisation; but needs to be realised is that there are severe limits to what can be achieved by the Railways themselves. Much will depend upon what is happening in the society as a whole."



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## CHAPTER VII

### ECONOMY IN STAFF EXPENDITURE SOME POTENTIAL AREAS

#### 1.0. Introduction.

1.1. Having dealt with the need to raise the productivity of railwaymen, we will in this Chapter discuss few vital and expansive areas of activity where a large body of railwaymen are employed and underutilised.

1.2. The areas taken up for such representative study include :

1. Steam sheds
2. Workshops
3. Intermediate yards
4. Control Offices
5. Track maintenance

1.3. For each area, we have delineated the measures to be employed to cut out the waste of human resource.

#### 2.0. Closure of steam sheds.

2.1. We have clearly brought out in the Chapter\* on Steam Traction of this Report that the steam locomotives on line have not gone down in proportion to the fall in the steam hauled traffic, and that they are far in excess of the actual requirements. The excess number of steam locos have to be withdrawn from line forthwith and condemned even if they have not lived their entire life. It is time that the Railways should, in their own interest, seriously consider an accelerated removal of steam locomotives from line.

2.2. We had in Part II† of our Report on Transportation given a perspective plan of phasing out of steam locomotives

Table 7.1

**Perspective plan for phasing out steam traction**

	Broad Gauge			Metre Gauge		Narrow Gauge	
	Steam	Diesel	Electric	Steam	Diesel	Steam	Diesel
Holdings on 31-3-1982	3,975	1,966	1,086	2,423	478	340	78
Anticipated in 1989-90	1,000	2,272	1,934	450	1,078	190	138
Anticipated in 1994-95	55	2,747	2,869	143	1,358	Nil	213
	Steam totally eliminated in 1995-96			Steam totally eliminated in 1996.		Steam eliminated	

2.3. The Committee had further brought out in Part-V‡ of their Report on Production and Maintenance of Rolling Stock that the Railways did not have any perspective plan for the closure of steam sheds. The closing down of steam shed facilities has been adhoc without any thoughtful planning regarding deployment of men rendered surplus, alternative use of the land and covered accommodation etc. The middle-level Managers found themselves frequently confronted with summary instructions and it is left to the Divisional Railway Managers to plan closure of the sheds without any firm and well conceived directive from the top.

2.4. We have also brought out in Part-II§ of our Report on Transportation that on replacement of the existing fleet of steam locomotives by diesel/electric, 63,400 staff on maintenance and 45,000 running staff would be saved. The overall saving in manpower would thus be over 1.08 lakhs which alone would give a recurring annual saving of approximately Rs. 108 crores.

2.5. The problem of redeployment of staff is, therefore, of paramount importance in the interest of financial and operational health of the Railways. We appreciate

that the redeployment of such a large chunk of employees will pose a number of serious problems. The principals nature of the problems, as we learnt from our discussion with the field officers, various Divisions and Zones, were delineated by us in Part V\*\* of our Report on Production and Maintenance of Rolling Stock. These problems cannot be dealt with summarily and as we recommended\*\* earlier, a Group of Railway Experts should be set up to work out a redeployment programme consistent with the accelerated phasing out of steam :

2.6. We have studied the positions on Northern Railway in some detail. The Broad Gauge steam loco holdings of this Railways on 1 April, 1982 were.

WP	..	145
WP/P	..	7
WL	..	65
WG	..	420
HPS 2	..	58
CWD	..	278
WM	..	14
Total		987

\* Para 14.0 of Chapter III.

† Cf. paras 4.11, 4.12 and Table 7.3 of Chapter VII.

‡ Cf. para 2.0 and 3.0 of Chapter III.

§ Cf. para 3.2 of Chapter VII.

\*\* Cf. paras 2.0 and 3.0 of Chapter III.



2.7. The Railway Board had approved condemnation of all HPS2 and WM locomotives and in addition 85 CWD locomotives. In replacement, they issued orders for transfer of 58 WG, 21 WP and 5 WL locomotives from Southern and South Central Railways. With these adjustments, the Broad Gauge steam loco holdings on Northern Railway should come down to 902 against the requirement of 853 steam locomotives as per the latest power plan.

2.8. Though the Northern Railway had a plan to condemn 169\* locos, they condemned only 118 locos. We also understand that the Railways can condemn more CWD class locos provided that the branch line tracks are made fit for WP/WG locos and the existing turn tables are extended so that CWD class locos could be withdrawn from the system and substituted by WP and WG class locos.

2.9. The main line from Mughalsarai to Delhi on the Allahabad Division of Northern Railway was completely energised in 1975, but none of the steam sheds on this Division has been closed. One reason put forward is that the goods sheds and sidings on Allahabad Division were not taken up for electrification as a result of which the electric locos are not able to take over the shunting services in the yards or on the main line.

2.10. One such instance of tell-tale incongruity can be cited. As many as 27 WG and 22 CWD steam locomotives homed at the Tundla shed of Allahabad Division can be conveniently replaced by only 5 WDS4 shunting locos and 9 WDM2 diesel locos for yard shunting, main line pilotage and sectional passenger services. As a matter of fact with these inputs, the existing shed homing about 50 locomotives can be closed and the arrangement would be not only highly more economic but also prone to greater efficiency of operations. The sizeable reduction in personnel would certainly be an additional but important benefit that would accrue.

### 3.0. Partapgarh Shed : Closure

3.1. It has been our experience that in the closure of steam sheds the Railways have not only shown a lack of vision and earnestness, but have also given rise to anomalies and distortions. In order to illustrate these points we have made a representative study on the closure of Partapgarh Steam Shed on the Lucknow Division of Northern Railway.

3.2. Partapgarh steam loco shed was closed down on 1 November, 1982. Out of the 29 CWD steam locos homed at this shed, 19 locos were condemned and the remaining 10 were transferred to other sheds.

3.3. The actual working strength of maintenance staff at the time of closure of the shed was 224. Of this, 95 men were absorbed against the existing vacancies either at Partapgarh itself or elsewhere on the Division. It was not possible to transfer the rest of the men owing to a commitment given to the trade unions that no staff would be transferred against their consent.

3.4. The work of rehabilitation of steam loco tenders is expected to absorb 115 men and for the remaining

alternative jobs were still to be found. The outturn of these 115 men is precipitously low because they have neither been exposed to such work nor is the shed equipped with requisite machinery to undertake work of this nature. In fact there appears to be a complete stalemate: against the anticipated outturn of 1.5 tenders per month, no tender has yet been rehabilitated, even though the personnel were engaged on this work from May, 1983.

3.5. Chittaranjan Locomotive Works is/are manufacturing spare tenders for supply to all Railways. Tenders are also being rehabilitated at Charbagh Workshop. It is also understood that Chairman, Railway Board, during his inspection of Pathankot/Amritsar on 14/15 April, 1983, had instructed that repairs of tenders should not be attempted in abandoned loco sheds, and that instead periodical overhaul of four-wheeler freight stock should be undertaken in these sheds. The sanctioning of the estimate in July, 1983 by the Zonal Railway for undertaking tender repair work in the closed Partapgarh Shed is contrary to this directive of the Chairman, Railway Board and also does not appear to be prudent on any consideration.

3.6. We understand that the Railway Board had issued instructions in January, 1982 that every railway should set up a standing Task Force for identifying and isolating the posts which become surplus as a result of full or partial closing down of steam loco sheds, marshalling yards etc. and transferring the same to the category of special supernumerary post in the same grade. The incumbents against these posts should be re-deployed against other live posts as far and as early as possible.

3.7. They also directed that there should be no recruitment in the categories in which posts have been declared surplus to enable quick redeployment/absorption of surplus personnel. The surplus staff could be deployed either in the existing vacancies in identical posts or against new posts which might be created for new activities. The implementation of these instructions can be effectively coordinated only by the Headquarters Office. We understand that on the Northern Railway, though Chief Planning Officer has been nominated for this job, the 'bank' of surplus staff has not yet started functioning for want of inputs.†

3.8. From our study of closure of steam sheds on the Northern Railway, the following points emerge :

1. The holding of steam locomotives on the railway are more than required.
2. The locos planned for condemnation are not swiftly condemned.
3. Though the electrification of Mughalsarai-Delhi section commenced in 1967 and completed in 1975, no steam shed has been closed on this route.
4. For accelerated closure of steam sheds which is desirable, the Railway Board would have to ensure replacement of steam engines by diesel locos for yard shunting and on few passenger services.\*

* CWD	...	85
HPS 2	...	58
WM	...	14
WP/P	...	7
WL	...	5
		<hr/> 169

† In fact our specific recommendation regarding the meaningful revamping and usage of the Chief Planning Officer and his organisation do not seem to have been considered or implemented by the Railway Board in the correct spirit.

\* Also cf. paras 4 and 5 of Chapter VII of Part II of our Report on Transportation and para 4 of Chapter IV of Part V of our Report on Production and Maintenance of Rolling Stock.



5. Thus for instance 50 steam locos of Tundla Shed can be replaced by only 5 WDS4 and 9 WDM2 diesels. Their would be many other similar instances which the Railway should identify.
6. A commitment appears to have been held out by the Division to the Unions that the Loco Shed staff at Partapurh will not be transferred and that they will be employed on locomotive tender rehabilitation work. This commitment was not in the over-all interest of the Railways.
7. The Railways in order to justify the retention of staff at Partapurh have created an artificial work load of rehabilitation of tenders which work could have been done in workshops more quickly and at less cost\*. The staff have been idling since long and they have not been able to deliver the goods.
8. Further though Partapurh Shed was planned to be closed down in November, 1982 some items of costly machinery, namely, portable diesel engine driven air compressor and 5-tonnes capacity wire rope type electric hoist with trolley were received in the shed in July and August, 1982 respectively just before the closure.

3.9. Our study of the Northern Railway establishes that the Railways do not really have a perspective plan for closure of the steam sheds. They have been shying away from the problem of redeployment of staff. We also understand that for want of sufficient funds, the number of diesel locos, (including diesel shunters), to be produced in 1983-84 would be less than the production capacity of diesel Locomotive Works, Varanasi and Chittaranjan Locomotive Works, Chittaranjan. This would further delay the closure of steam sheds.

3.10. It is time that it is appreciated that the condemnation of steam locomotives and closure of steam sheds is a highly important matter and merits consideration and deliberation at the highest levels and cannot be left to be decided by the Divisions. A systemic approach will be necessary, clearly earmarking which sheds have to be closed in what order and when, how many of the locomotives have to be condemned or transferred elsewhere, how many diesel locos, including shunters, have to be supplied as replacements, where the staff rendered surplus has to be redeployed and what alternative use is to be made of the land and facilities available in the various sheds.

3.11. If a well-conceived corporate plan is not clearly laid down right away†, the Railways will have to pay heavy penalties. It is for want of such comprehensive and well thought-out policies that the Railways have been exposed to wasteful expenditure. The damage to the Railways economy would assume high proportion in the time to come if the Railways do not take this up with seriousness and objectivity.

3.12. We recommend the following.—

1. The production capacity of the manufacturing units at CLW and DLW should be utilised in full so that there is no delay in the supply of diesel shunters/diesel locos to the Zonal Railways to expedite closure of steam sheds. In fact the production of diesel shunters should be given a high priority even by reducing the programme of production of main-line diesel locomotives, should that be necessary.
2. With the concept of point-to-point running of block rakes, the work in the intermediate yards should heavily come down.† A detailed study will be necessary to close down many yards (or parts thereof) or to bring down the number of shifts. This will eliminate/reduce yard shunting and as a consequence, replacement requirements of steam shunting locos would get reduced.
3. The Railways should abjure a policy of drift in matters relating to re-employment of staff on the closure of steam locomotive sheds. Compromised decisions would only snowball the problem of both management and staff. It is essential that trade unions offer their unstinted cooperation in this national cause. The administration should also meet the situation squarely, and in full awareness of the likely consequences. The Zonal Railways should of course have frank and forthright discussions with the trade unions at their periodical meetings, but they should thereafter go ahead with the implementation of the programme of phasing out of the steam sheds and effecting economy in the usage and deployment of released personnel.
4. The staff rendered surplus should be suitably trained†† for redeployment in other activities. Some diesel sheds have been found to be reluctant to absorb the skilled staff released from closed steam sheds and want to make fresh recruitments against vacancies released by steam loco sheds. The released skilled staff should be absorbed in diesel sheds after suitable training.
5. We have mentioned in our Report on Production and Maintenance of Rolling Stock that the facilities in workshops and sicklines for overhaul of wagons and coaches are much too inadequate and this is resulting in deterioration of the health of the fleet of wagons and coaches\*\*. To improve the productivity of the rolling stock, the maintenance facilities, both in the workshops and sicklines, will have to be augmented. Among other things, this would require additional staff which can be found from the surplus generated on account of closure of steam sheds. Most of the staff rendered surplus in steam sheds belong to fitting and boiler trades and would require only minimum re-training for being used for carriage and wagon repairs.@

\* Charbagh Workshop rehabilitated 22 tenders in 1982-83 with only 55 additional staff.

† We have worked out and recommended a corporate plan for phasing out of steam locomotives in Part V of our Report on Production and Maintenance of Rolling Stock. This needs to be urgently retrieved by the Railway Board and considered for implementation.

† Also Cf. para 5 of this Chapter.

†† We are told that some ITIs are willing to train staff free of cost.

\*\* Cf. para 25 of Chapter II of Part V of our Report on Production and Maintenance of Rolling Stock.

@ We find that on Southern Railway, Basin Bridge shed has been converted into a depot for maintenance of high speed coaches and the Jolarpet and Erode loco sheds have been converted into Carriage and Wagon repair depots.



Table 7.2

## Manpower ratio

Workshop	Out turn equated in BG wagon units	Total staff	Staff on additional lines of production	Balance staff (3)-(4)	Manpower ratio (5)÷(2)
1	2	3	4	5	6
Parcel	11,419	5,399	2,750	2,649	0.23
Jamalpur	18,301	9,399	3,174	6,225	0.34
Charbagh	10,551	4,032	740	3,292	0.31
Porambur (E)	10,778	3,720	1,010	2,710	0.25
Dahod	13,806	2,436	244	2,192	0.15
Matunga	21,125	5,454	326	5,128	0.24
Jhansi	20,082	5,210	105	5,105	0.25
Liluah & Andal	25,784	8,660	437	8,223	0.31
Kanchrapara (C & W)	13,938	4,450	50	4,400	0.31
Alambagh	17,435	4,239	143	4,096	0.23
Jagadhri	21,617	4,747	225	4,522	0.20
Perambur (C & W)	23,177	6,673	1,315	5,358	0.23
Parcel & MX	15,668	3,792	192	3,600	0.22
Kota	11,042	2,586	161	2,425	0.21
Raipur	8,941	1,535	22	1,513	0.16
Jodhpur	9,311	2,288	329	1,959	0.21
Bikaner	6,251	1,668	83	1,585	0.25
Gorakhpur	22,454	4,982	456	4,526	0.20
Izatnagar	9,302	2,442	266	2,176	0.23
Samastipur	1,820	496	170	326	0.17
Dibrugarh	5,862	1,535	55	1,480	0.25
New Bongaigaon	8,787	1,764	57	1,707	0.19
Golden Rock	10,308	5,469	2,886	2,583	0.25
Mysore	7,242	1,937	159	1,778	0.24
Hubly	16,331	3,668	17	3,651	0.22
Ajmer	22,688	6,669	909	5,760	0.25
Lallaguda	14,146	3,459	29	3,430	0.24
Kharagpur	32,126	9,984	1,448	8,546	0.26
Kalka	732	638	495	143	0.19
Nagpur	2,152	958	108	850	0.39

6. Arrangements as at Pratapgarh for rehabilitation of tenders on the closure of the steam shed are quixotic in nature, and are neither financially nor administratively prudent. Setting to retrieve tenders at Pratapgarh is anomalous and inefficient and the still-born experiment should be immediately given up.† The Railways, wiser by the experience of Pratapgarh, should also immediately arrange to study and identify all such similar misadventures, close them down completely and arrange to suitably retrain and redeploy the released staff on the division or the zone.

7. The Railway Board should immediately prepare a comprehensive and well considered corporate plan clearly delineating which sheds have to be closed and when, how many of the locomotives homed there have to be condemned and transferred elsewhere how many diesel locos have to be supplied as replacements, how will the staff rendered surplus be redeployed and what trainings are necessary before the redeployment and what alternative use is to be made of the land and facilities available in the various sheds and also what are the categories where the surplus is likely to take place so that future recruitment in these categories is stopped.‡

8. The best of objectives, policies and programmes are ineffective until they are put into action. By simply laying down plans and issuing instructions to zonal railways, the job does not end. There remains the need for monitoring the performance to see what is actually happening so that instructions are changed where necessary to suit changing circumstances.

#### 4.0. Productivity rating of workshop.

4.1 One of the indices used to measure the productivity of workshops is the manpower ratio. This ratio gives the number of men required per year to periodically overhaul one standard unit.\* For ease of inter-shop comparison the output of the workshop is converted to equated number of broad gauge wagon units and for this purpose, a coach is taken as equivalent to 4.4 wagons and a steam loco as equivalent to 44 wagons.

4.2 Table 7.2 gives the manpower ratios of different workshops for the year ending March, 1982. The manpower ratios show wide variations the range being 0.15 for Dahod Workshop on Western Railway to 0.39 for Nagpur Workshop on South Eastern Railway. The productivity of Charbagh on Northern Railway, Liluah, Kanchrapara and Jamalpur on Eastern Railway and Nagpur Workshop on South Eastern Railway is particularly low. The manpower ratio on these workshops is much higher than the target of 0.25. If these workshops had managed to work up to the target, their manpower requirement would have been less by over 5,000 men.

4.3. We understand that some of the Railways are showing excessive staff on additional lines of production so that the balance staff used for computation of manpower ratio is reduced. The Zonal Railways have been recently told by the Railway Board that this is no way of showing higher productivity and that they should, instead, aim at increasing the outturn of the shops to bring down the manpower ratio. This practice must be effectively stopped, sooner the better.

† The surplus staff at Pratapgarh do not have the requisite skill and the calibre and would not be able to deliver the goods.

‡ Cf. Parts V and IX of our Report on Rolling Stock and Personnel

respectively.

\* The broad gauge wagon is taken as a standard unit. The target of manpower ratio set for this unit is 0.25.



4.4. The Railways have taken up modernisation of workshops. In the first phase, which is now well advanced, four overhaul workshops, viz. Kanchrapara, Matunga, Kharagpur and Parel have been identified. With improvement in the layouts, introduction of efficient material handling equipment, introduction of the latest technology, computerised production control and management information system, the outturn of the workshops should show a significant increase. This should bring down the manpower ratio from the existing target of 0.25.

4.5. We also find that though the manpower ratios for steam locos is available, no time and motion studies have been carried out to develop norms for diesel/electric locos. The diesel and electric tractions have been in existence for a considerable period and the Railways would have by now gained sufficient experience to fix realistic norms for these locos too. This is necessary in the interest of economy and for better management control.

4.6. We recommend :

1. Even though the workshops on the zonal railways are now headed by Chief Workshop Engineers, doubts are being raised about what items should constitute additional lines of production and how the staff to be allocated to these additional lines of production determined. The Railway Board should issue clear instructions in the matter.
2. The tendency to artificially lower the manpower ratio by assigning large number of staff to the additional lines of production should be curbed. Wherever it is observed that the manpower ratios are high, either the outturn should be raised or the manpower requirements cut down.
3. The Railways have taken up modernisation of workshops. With more sophisticated and modern machinery and plants and with improved workshop layout and material handling arrangements, there should be a significant increase in the out turn of the workshops. This aspect should be taken care of in due course and the present target of 0.25 revised suitably.
4. The Railways should carry out time and motion studies and develop scientific norms of manpower ratio, for diesel/electric locos. These studies should be carried out independently without in any way linking them with the studies carried out for wagons/steam locos and should be completed within a period of one year.

5.0. Intermediate yards : closure :

5.1. We have already brought out\* that the Railways had developed small and intermediate yards at a distance of every 130 to 150 Kilometres for sorting and formation of goods trains. This development was a direct consequence of the pattern of steam traction whereby the yards were made coterminous with the possible runs during the prescribed hours of running staff.

5.2. With almost all the trunk routes now being gradually switched over to diesel or electric traction, and bulk of the total freight movement being carried in block rakes, intermediate sorting or examination is becoming increasingly uneconomic and superfluous.

5.3. It should be possible to close down such small and intermediate yards in view of the change in the pattern of movement under which broadly around 85 percent of the freight throughput should be moving in block loads by passing such yards. In respect of the remaining intermediate yards, it may not be necessary to work all of them round-the-clock.

5.4. The elimination of small and intermediate yards would cut down detentions to rolling stock and result in significant improvements in the turnround of wagons. Simultaneously there would be shrinkage of both the staff and the lines. The released staff can be retrained to help the Railways in expansions and in other areas where they may be required.†

5.5. While tendering evidence to this Committee, the General Manager, Eastern Railway, had mentioned that 1,400 men were rendered surplus by reduced work load in Asansol Yard. A somewhat detailed study has been made of the Ambala Goods Yard‡, which was closed down in March, 1982. The closure of this yard had resulted in 94 men out of the sanctioned strength of 373 being rendered surplus. Of the remaining 279 men 242 employees have been retained at Ambala to work in the coaching yard and the remaining 37 persons transferred to Khanalampura yard where the workload of sorting and marshalling has shifted due to closure of Ambala Yard.

5.6. Our study of Ambala Yard indicated that out of the sanctioned strength of 178 (part of the total strength of 373) of carriage and wagon staff, the number of staff released was only 14. These men have been transferred against new vacancies created at Bhatinda for dealing with additional foodgrains traffic. The remaining carriage and wagon staff have been retained at Ambala on the ground that a great deal of work has yet to be attended to on the sick lines. We suggest a closer scrutiny of the justification to surrender only 14 of the total strength of 178 carriage and wagon staff. Similarly it is suspect that only 94 out of 373 yard staff were rendered surplus and also merits a probe.

5.7. We recommend :

1. Rationalisation in the number and scope of small and intermediate yards should be taken up for a close scrutiny. A comprehensive plan, indicating which of the yard have to be closed down and when, which of the yards have to reduce number of shifts, what type of training would be necessary to staff rendered surplus, and where these staff should be used, and when should the lifting of the lines in the closed yards and their use elsewhere completed, should be laid down by the Railway Board and the Zonal Railways advised.
2. As mentioned earlier, an effective monitoring system should be devised to ensure physical execution of the plan.

\* Para 13.0 of Chapter V of Part II of our Report on Transportation.

† They may however, not automatically be retained at the same

place if alternative opportunities for absorption are not available there.

‡ A representative study made by us.



3. About the staff that would be rendered surplus, it should be ensured that the number is not artificially narrowed down under the apprehension of transfer or dislocation\* of such employees.

4. While efforts may be made to absorb as many staff in the same place or division as possible, this should not be done artificially without appropriate scope for such absorption being available, as has been done in case of Pratapgarh Loco Shed. The matter should be discussed between the labour unions and the Zonal Railway management in the quarterly meetings, but the released labour should be absorbed in installations and places where the opportunity exists against available vacancies. To the extent practicable, efforts should be made for such absorption within the same division or Zone.

5.3. The entire process of laying down the plan, measures to be taken for redeployment of staff, etc., could reasonably be completed within a period of one year.

#### 6.0. Control Office teleprinter circuits.

6.1. We have already brought out that one of the important functions of the Control office is to daily collect detailed information on a wide range of operating functions, such as availability of wagons, special goods stock, passenger coaches, locomotives etc. from different yards, loading points and important stations on the Division for reviewing and planning train operations. Collection of a plethora of information is being done on telephones utilising the already strained speech channels.

6.2. The present system of collection not only results in extensive occupation of the speech channels, but also requires a large complement of staff. For example, in this Control Office of Delhi Division of Northern Railway, around 50 employees have been posted for this purpose. If the information is collected on teleprinters and facsimile \*\* transmission the staff employed in the Control Offices to collect the information can be substantially reduced and surrendered.

6.3. There may be few other areas where use of teleprinters and facsimile transmission is feasible and economic. The Railways should conduct studies to identify these areas and adopt the best practices, not only for economy in staff but also for optimisation of performance.

#### 7.0. Gang strength

7.1. The repairs and maintenance of track is an important activity of the Civil Engineering Department. The speed and safety of the rail operation depends, to a large extent, on the strength of the track and quality of its maintenance.

7.2. The major component of track maintenance cost is labour. It is roughly estimated that the labour constitutes about 75 percent of the track maintenance cost.

7.3. Initially the gang strength was determined on the basis of Maflin's formula. This formula correlated the gang strength with the average number of trains run

over the track. Subsequently in Feb., 1959 the loco Committee evolved another formula known as 'Revised Maflin's Formula', in which weightage was given to various factors such as traffic density, type of formation, nature of alignment and amount of rainfall. Before the Railways could implement this formula fully, its further implementation was frozen in January, 1965.

7.4. At this stage, with advancement in technology and introduction of fast trains improved techniques of manual maintenance such as Directed Track Maintenance (DTM) and Measured Shovel Packing (MSP) were introduced. A beginning was also made to mechanise track maintenance. These changes necessitated the Railway Board to appoint a Committee, consisting of Railway Engineers, for going into the issue a fresh and recommend suitable yard stick for fixing the gang strength. The Report of this Committee, which was appointed in 1969 was received in August 1971. No decision was taken by the Railway Board on this Report.

7.5. The next step appears to have been to discuss the question of gang strength in a meeting of the Chief Engineers held in January 1976. In pursuance of the conclusions reached at this meeting the Railway Board appointed a Special Committee in January, 1976, comprising Chief Engineers of various Railway Director of Civil Engineering Railway Board and Director, Research RDSO. The Principal of IRIATT, Pune, was also co-opted as a special invitee.

7.6. The salient features of the report submitted by the Committee are :

1. The norms for various operations involved in the maintenance of track were fixed on the basis of experience of the Members of the aforesaid Special Committee and not on any field study.
2. The norms fixed for three main operations are.

Operations	per man per day	
	BG	MG
(i) Through packing	12 sleepers	14 sleepers
(ii) Through packing including shallow screening.	6 sleepers	8 sleepers
(iii) Picking up slack (It is expected that only 50% of the sleepers would need through packing while attending slack)	24 sleepers	28 sleepers

3. The formula recommended by the committee is.

For broad gauge —Manpower  $1.47 \times$  equated track kilometres.

For metre gauge —Manpower  $1.21 \times$  equated track kilometres.

The manpower, so worked out, is to be modified by applying the following correction factors.

\* Retrenchment of staff as a measure of changes brought about by management is not normally practised on the Railways and released staff is absorbed against vacancies in other work centres in the same or any other discipline (s) normally within the same Division or Zone to the extent feasible.

† Para 8.2 of Chapter VII of Part X of our Report on Signalling & Telecommunication.

\*\* It is possible to provide 12 teleprinter circuits over a single speech circuit by installing suitable additional equipment at a small cost.



## Type of track

Method of maintenance  
Conventional/DTM/MS  
DTM/MS raised.

Fish plated track including track layouts, running loops and sidings.	1.00	0.80
Short Welded Panel (SWP)	0.95	0.75
Long Welded Rail (LWR) on Metal and wooden sleepers.	0.85	0.60
LWR on concrete sleepers.	—	0.50

4. The gang strength formula does not include the element of leave reserves which has to be separately provided.

5. The gang strength so worked out does not include items of work which are occasional in nature, such as monsoon patrolling, painting of rails in station yards, etc. for which casual labour may be sanctioned by the Railways when required, depending upon the quantum of work involved.

6. A review of the formula would be necessary after adequate experience is gained about the modernisation of track maintenance.

7.7 The formula recommended by the Special Committee has been accepted by the Railway Board with the modification that the gang strength so worked out should be reduced by 5 per cent. The sanctioned gang strength the number of vacancies as on 31 March, 1980, are as under :

1. Sanctioned strength	1,59,565
2. Actual strength, including casual labour.	2,18,322
3. Number of gangmen required as per the formula recommended by the Special Committee.	1,82,492
4. Number of gangman in excess of the sanctioned strength (2) — (1.)	58,757
5. Number of gangmen in excess of requirement as per the formula of the Special Committee (2) — (3).	35,830
6. Number of vacancies	11,793

7.8. Subsequently the Railway Board took the following decisions in December, 1981.

1. The existing permanent vacancies of 11,793 gangmen should be filled up by those casual labour who are on authorised scales of pay. In addition, 4,651\* posts should be created and against them only the seniormost persons already working as temporary casual labour on authorised scales should be absorbed. The resultant casual labour posts would not be operated.

2. The Railway Board had also decided that a proper scientific study of gang strength is needed for which purpose the work study should be undertaken by associating an independent organisation like the National Productivity Council. No action has yet been taken on this decision.

7.9. The Railway Board had issued instructions to the Zonal Railways in January, 1981, requesting them to arrange for surrender of the surplus gangmen available as casual labour or enjoying temporary status for normal track maintenance. It was anticipated that with this action, the Railways would be able to save nearly Rs. 20 crores per annum.

7.10. A further decision was taken by the Railway Board in January, 1983 that the gang strength required on the basis of Special Committee's formula minus 5 per cent thereof, may be worked out and the required number of additional posts of gangmen created. The instructions also laid emphasis that in working out the gang strength for track modernisation etc., suitable correction factors are applied. Against these additional posts, the existing casual labour who are eligible to be regularised should be appointed and the resultant casual labour posts should not be operated.

7.11. The Commission on Public Expenditure had† made the following significant observations.

"The Railways are employing about 50,000 temporary gangmen and 41,000 casual labour for the maintenance of track, in addition to authorised sanctioned strength. Moreover while maintenance of certain tracks has been mechanised and a number of measures have been taken which result in reduction in manpower, like-Directed Maintenance, Measured Shovel Packing Long-welded rails, etc. no detailed scientific study appears to have been undertaken to adjust the manpower norms suitably.

"The question was discussed with the Chairman and Members of the Railway Board at a meeting held on 28 January, 1980 and the Member, Engineering conceded that the entire casual labour of 41,000 could be dispensed with. The matter was to be discussed further with the Chairman, Railway Board as it appeared that there was scope for further curtailment of gang strength, but due to winding up of the Commission, this meeting did not materialise.

"It is suggested that the entire casual labour should be dispensed with as early as possible and the scope for further reduction examined on the basis of a proper O & M study".

7.12. We have deliberated over this issue and have come to the conclusion that for an important activity such as maintenance of track, involving deployment of over 2 lakh persons, it was absolutely essential for the Railways to have carried out extensive field studies to arrive at scientific norms. The decisions based on experience of the Members of an Expert Committee, would be of doubtful validity and can lead to wrong fixation of gang strength. By way of illustration, we

\* When the decision was taken there was a proposal with the Board for creating 21,095 posts to achieve decasualisation. After excluding 11,793 vacancies which were to be filled in by casual labour, the balance left would be 9,302. It was decided

to create posts equal to half the number of this balance.

† This Commission was appointed in May, 1979 and terminated in January, 1980.



may mention that some studies\* were carried out by RDSO in the machine maintained sections of long-welded rails and the correction factors suggested by them are comparatively lower than those recommended by the Special Committee :—

1. Operation	Correction factor for machine maintenance of track	
	As per Special Committee's formula	As per the trial conducted by the RDSO
Long-welded rails on wooden, metal sleepers.	0.60	0.47
Long-welded rails on concrete sleepers.	0.50	0.50

If, therefore, the correction factors as recommended by RDSO are applied the gang strength would work out to be much less.

- The formula suggested by the Special Committee presumes that for all gauges and for all routes, the sleeper density would be  $N+6$ , i.e. 1,566 sleepers per kilometre. According to the existing Broad Gauge track standards, Group A, B and C routes should have a sleeper density of 1,540 sleepers per kilometre. Group D routes should also have the same sleeper density except when the traffic density is under 10 GMT + per annum in which case the sleeper density should be 1,310 sleepers per kilometre. On Group E routes, the prescribed sleeper density is 1,310 sleeper per kilometre irrespective of the traffic density. The sleeper density on branch lines of metre gauge and on all narrow gauge lines is also less than 1,566 sleepers per kilometre assumed by the Special Committee. Further there are sections where the actual sleeper density is much less than the laid down standards. Thus the presumption of the Special Committee that for all gauges and for all routes, the sleeper density would be 1,566 sleepers per kilometre is not valid.
- The formula worked out is on the basis that in addition to one complete round of systematic through packing there would be ballast screening with through packing for about 1/3rd of the gang beat every year. It is the view of some expert engineers that it is not necessary to disturb the through packing more than once in a year and hence one full round of systematic through packing including ballast screening of 1/3rd of the gang beat should suffice. If this argument is accepted, especially for lines where traffic density is not heavy and the type of soil is good, the requirement of gang strength would go down.
- Even if the formula laid down by the Special Committee is accepted, the number of gangmen available on 31 March, 1980 were in excess by

35,830. This number would go up to 44,842 if the decision of the Board to work out the gang strength as per the formula of Special Committee less 5 per cent is applied. This excess number should be surrendered. For works of occasional nature, depending upon the scope of the work, casual labour can be sanctioned for brief periods rather than their being continued in perpetuity.

#### 7.13. We recommend.

- For Group D routes of broad gauge having density of less than 10 GMT, for all Group E routes on the broad gauge, some of the branch lines on the metre gauge and the entire kilometrage on the narrow gauge, the number of sleepers to be taken per kilometre for the purpose of computation of gang strength should be less than 1,566 (recommended by the Special Committee) and this fact should be taken into account while computing the gang strength.
- The Railways have been told to work out the gang strength on the basis of the formula suggested by the Special Committee, less 5 per cent. In that case, the Railways must also ensure that the type and also the magnitude of operations as taken into account by the Special Committee in their computation are actually performed in the field.
- There should be no increase in the existing sanctioned strength of gangmen, even for the purpose of decasualisation of labour.
- The number of casual labour in excess of the requirement (44,842)§ should be surrendered.
- The existing ban on recruitment of casual labour should continue.
- Efforts should be made to transfer the casual labour surrendered wherever possible for new areas of construction or on track renewal works, etc.
- Decision taken by the Board in December, 1981 to have a work study undertaken by associating an organisation should be translated into action. One of the terms of reference of this independent body should be to scientifically study the operations involved in the maintenance of track, and give recommendations whether in addition to one complete round of through packing, it is necessary to have ballast screening including through packing for about 1/3rd of the gang beat. The independent body should also consider whether the type of operations and the frequency of operations should be different for different routes. After the work study report of the independent body is received and studied, the Railways may consider revision of the sanctioned strength of gangmen.
- Once our recommendations to step up the pace of renewal of track and to provide adequate cushion of ballast are implemented, the quantum of staff required for maintenance of track would significantly come down. This aspect should also be considered by the independent body.

\* Report No. C-187 of August, 1981.

† In a rail length of 14 yards, number of sleepers =  $14 \div 6$  i.e. 20.

‡ Gross Million Tonnes.

@ Also Cf. para 5 of Chapter I of Part III of our Report on

Railway Track, Bridges & Lands.

† This view was expressed in 1979 by Director, Railway's Planning, Railway Board and Chief Engineer, Northern Railway.

§ Latest position is not available. This will also get revised on implementation of 7.13 (1.) above.



### 8.0. Redeployment of staff : strategy.

8.1. The Committee have not been able to go into each and every activity in which the Railways are engaged. We have concentrated our attention only to those areas and work-centres where a large percentage of railway staff are employed and where the human resources are being underutilised. We need not emphasise that once the strength of staff in the field is reduced there would be a corresponding reduction in the Personnel and Accounts Departments.\*

8.2. The Committee would, even at the cost of repetition, like to emphasise that training and redeployment of staff rendered surplus due to closure of steam sheds etc. should not be left to the Divisions, but coordinated at the headquarters of the Zonal Railways. For this purpose, a 'surplus staff bank' should be opened in the headquarters. The input to this 'bank' would be of the staff rendered surplus due to closure of steam sheds, yards etc. As and when the staff are rendered surplus, the sanctioned strength of the concerned unit should be reduced and the reduction depicted clearly in the relevant cadre check register.\*\* Simultaneously, special supernumerary posts should be created against which the staff in the 'bank' should be shown and a separate pay bill prepared for such surplus staff till they are absorbed in other activities or expansions.

8.3. The staff in the 'bank' should be retrained according to the preset plan and redeployed in other activities as early as possible. We suggest that the Chief Planning Officer,† Chief Personnel Officer and the Financial Adviser and Chief Accounts Officer should be nominated to monitor the operation of this 'bank' including the training and redeployment of surplus staff.

8.4. The Committee have gained an impression that the codal instructions to exercise cadre check are not being faithfully implemented. This is an important area of control and should not fall into disuse. The system of cadre check should be revived and it would be much better to put it on the computer.

8.5. The surplus staff would be substantial and would belong to various categories. All of them cannot be instantly trained and employed elsewhere. The training and absorption of this staff in other areas of activities will take some time but could be a continuous process. In order, however, to speed up matters, the Railways should give priority to all the necessary operations.

8.6. We also recommend that the existing sanctioned strength of railwaymen should be frozen for a minimum

period of five years. If justified, with attrition of staff the sanctioned strength curtailed. It is hoped that the Railways by that time would be able to fully assess the impact on staff of the improved operational practices, better traction, use of advanced technology, automation and modernisation of their system. A review may then be undertaken.

### 9.0. Monetary savings.

9.1. We have mentioned earlier that we have not gone into each and every activity in which the railways are engaged. By way of representative analyses, we have chosen areas and work-centres where large concentration of staff are employed and where there is possibility of sizeable reduction in manpower. The number of staff that would be rendered surplus in the near future in the areas selected by us are broadly as under :

Activity	Number of likely surplus staff
1. Closure of steam sheds and change-over of traction from steam to diesel/electric.	9,000‡
2. Productivity in workshops	5,000 ††
3. Closure of intermediate yards	10,000@
4. Control offices	3,000§
5. Casual labour	30,000*†
Total	57,000

9.2. The average annual cost per employee today is over Rs. 10,000 and, therefore, the savings in the areas studied by us would work out to Rs. 57 crores per annum. Considering the remaining areas of activity not studied by us and the scope of raising the productivity of staff from its present low standards, the Railways should, in our view, be able to save roughly Rs. 100 crores per annum. This is barely 6 to 7 per cent of the cost of staff and is not an over ambitious target.

9.3. In the years to come, the savings would rise with the increased surplus generated due to closure of steam sheds, modernisation of workshops, automation, improved operational practices etc.

### 10.0. Post-script :

10.1. During the course of our investigation we were informed of certain practical problems faced by the railway administration :

1. First, the recognised trade unions are somewhat averse to moves to cut down human resources wastes.

\* This is valid also as a corollary to the surrender of staff on closure of yards and steam loco sheds.

\*\* This register is to be maintained to ensure that the appointments are not made in any cadre or class of railway service in excess of the sanctioned scale and that no post is filled or held in obedience without the orders of the competent authority.

† We recommend that the Railway Board may take a fresh look at our recommendations regarding the Chief Planning Officer and his Organisation (Cf. para 15, of Chapter II of Part II of our Report on Transportation) as these have not at all been considered in the proper spirit and the correct perspective.

‡ The saving in manpower on complete switchover from steam to diesel/electric by 1995 would be 1.08 lakhs in number. In this connection, cf. para 2.4 of this Chapter. The number of staff rendered surplus would thus be around 9,000 per annum.

†† Cf. para 4.2 of this Chapter.

@ There were 178 marshalling yards on the Railways, as on 30 September, 1981 (para 29 of Seventy Third Report of Public

Accounts Committee (1981-82)—Remodelling of Mughalsarai Marshalling Yard). Looking to the number of men rendered surplus at Asansol and Anbala goods yards, and the number of marshalling yards on the Railways, it can be safely presumed that 10,000 men can be taken off from the yards to be deployed elsewhere. (Cf. para 5.5 of this Chapter).

§ Our study of Delhi Control office has shown that 40 to 50 men can be saved by using teleprinter circuits—Cf. para 6.2 of this Chapter. Having regard to the number of control offices on the Railways, about 3,000 staff would be rendered surplus.

\*† If the Special Committee's formula less 5 per cent is adopted to determine the gang strength, over 40,000 gangmen will be rendered surplus. (Cf. para 7 of this Chapter). This figure will get somewhat reduced if the number of casual labour required for doing occasional nature of works are taken out. But at the same time the surplus would increase if the modifications suggested by us are made viz. changing the number of sleepers per km. for group 'E' routes, some branch lines of Metre Gauge and Narrow gauge lines. Therefore, it would not be unrealistic to presume that 30,000 gangmen (casual labour) are surplus.



2. Secondly, the management who are seized of the necessity to cut down the waste of human resources, find themselves powerless without the whole-hearted political backing.

3. While the management can press the issue, which they must do, not much headway can be made without the support of the political will and the cooperation of the responsible, recognised trade unions.

10.2. From the workers view-point the fear seems two-fold :

1. Their jobs being endangered.

2. Their physical displacement being more than likely.

10.3. One is unjustified, the other a mistake. Former is unjustified because administration has given every evidence of re-training and re-deploying surplus available men in existing vacancies or new activities, and many of them may even find better opportunities. The latter is a mistake because a worker belongs to the modern age and can remain bound to his place which may not be best for his future. Physical mobility, acquiring new skills, education and creative participation in the management of their organisation should be the true ideology of a worker. While this may be so, the management should also appreciate that in the prevailing economic conditions they should play their rightful role in improving the lot of their workers by building additional houses providing educational facilities and creating healthy and happy working environments.

10.4. Our visits to various railway offices and workshops have convinced us that the general discipline is low in many areas and installations. Unless a climate conducive to discipline is created, no worth-while economy in staff can ever be achieved. On the other hand, the productivity of the staff will continue to fall. This is a serious problem which cannot be ignored any longer. The management, the trade union and the political leadership will have to work in tandem. It is only then that the Railway would be able to realise the true potential of the human resource at their command to meet the challenges lying ahead of them. All three therefore must bend themselves to this task without which the optimum productivity of staff cannot be realised despite automation, introduction of improved operational practices, modernisation, etc.

#### 11.0. Conclusions:-

11.1. The holdings of the steam locomotives on the railways are still many more than required. Furthermore, the locos planned for condemnation are not swiftly condemned. The excess number of steam locos should be withdrawn from line and condemned forthwith.

11.2. On complete replacement of the existing fleet of steam locomotives by diesel/electric locomotives, about 63,000 staff on maintenance and 45,000 running staff would be saved. But the Railways have no perspective plan in the matter and have been shying away from the problems of re-deployment of surplus staff and alternative use of land and facilities available in the steam sheds.

11.3. A comprehensive and well-considered corporate plan clearly delineating as to which steam sheds have to be closed and when, how many of the steam locomotives have to be condemned and transferred elsewhere, how many diesel locos have to be supplied as replacement, how should the staff rendered surplus be redeployed and what alternative use should be made of land and facilities available on the sheds should be clearly laid down and physical execution of the plan monitored. Otherwise, the railways, exposed to heavy

wasteful expenditure, will face deleterious consequences in their position of viability and productivity.

11.4. The closed steam sheds should not be used for uneconomic activities. The rehabilitation of tenders at Pratapgarh and like places should stop and alternative work for the staff found.

11.5. The production capacity of the manufacturing units should be fully realised and adequate number of diesel shunters/diesel locos supplied to the Zonal Railways to expedite closure of the steam sheds.

11.6. The Zonal Railways should discuss the matter with the trade unions in their periodical meetings. The released labour may be absorbed at places where vacancies are available. Efforts should be for such absorption within the same division or Zone.

11.7. The Zonal Railways should not artificially adjust manpower ratios by assigning larger number of staff to the additional lines of production. The right way to increase the productivity of the workshops is to increase the output and cut down the manpower requirement.

11.8. With modernisation of workshops the manpower ratio should substantially come down, necessitating downward revision of the present target of 0.25.

11.9. The Railways should also lay down manpower ratios for diesel/electric locos by carrying out independent time and motion studies.

11.10. As in the case of steam sheds, a comprehensive plan should also be prepared for closing down small and intermediate yards, which will be by passed by bulk of the traffic moving in block loads.

11.11. The collection of day-to-day information in the control offices and in other feasible areas should be done through teleprinters and facsimile transmission.

11.12. The formula suggested by a Special Committee for computation of gang strength should be carefully examined and revised.

11.13. The sanctioned strength of gangmen should be frozen and no more posts created even for the purpose of decentralisation of labour. The number of casual labour in excess of the requirement should be surrendered.

11.14. As already decided by the Railways, a work study should be immediately undertaken by associating an independent organisation such as the National Productivity Council to evolve norms for gang strength.

11.15. The training and redeployment of staff should be coordinated at the headquarters of the Zonal Railways through operation of a 'surplus staff bank'.

11.16. The existing sanctioned strength of railwaymen should be frozen for a minimum period of five years. Wherever justified with due reduction in staff the sanctioned strength should be curtailed.

11.17. The monetary savings in staff would depend upon the Railways ability to create a climate of discipline and the seriousness with which our recommendations are examined and implemented. Broadly the savings should be of the order of Rs. 100 crores per annum to start with.

11.18. The management the leaders of the recognised trade unions and the political leaders will have to work in harmony if any worthwhile economy in staff is to be achieved.



## CHAPTER VIII

### ECONOMY IN STORES : INVENTORY NORMS AND QUALITY CONTROL

#### 1.0. Introduction.

1.1. The efficient operation and maintenance of the railways depends largely on the timely and adequate supply of rolling stock, plant and equipment, spares, raw materials, track materials, consumables, uniforms etc. For this purpose, the Railways have to procure and stock over one lakh different items of stores.

1.2. The materials management is a highly complex and specialised job. It involves planning and programming for purchases, procurement, inspection, storage, supply and control over inventory.

1.3. The expenditure on stores (including fuel) accounts for over 40 per cent of the annual railway expenditure (including that which is chargeable to Capital)†. The quality of materials management plays a key role in the viability and profitability of the organisation.

1.4. The subject of inventory management is so important that we have decided to deal with it extensively in two exclusive Chapters in a subsequent Report.\*

In this Chapter, we have brought out the monetary benefit by way of economies that the system can derive by good inventory management. We have also briefly discussed about the need for quality control as an aspect integral to inventory management.

#### 2.0. Stores balances vis-a-vis issues.

2.1. The inventory balances held as at the end of the financial years vis-a-vis the issues made during the course of respective years, over the past decade, are indicated

in Table 8.1 below :—

Table 8.1  
Inventory vis-a-vis issues

Year	(Rupees in crores)		
	Without fuel		
	Inventory as at the end of year†	Issues during the course of the year	Percentage (Inventory to issues)
1	2	3	4
1968-69	151.87	181.87	84
1970-71	146.64	201.44	73
1971-72	182.65	237.58	77
1972-73	204.39	291.82	70
1973-74	188.90	308.42	61
1974-75	194.13	345.35	56
1975-76	190.96	442.52	43
1976-77	163.91	469.69	35
1977-78	158.09	483.75	33
1978-79	166.72	502.22	33
1979-80	223.43	567.50	39
1980-81	295.12	713.83	41
1981-82	359.91	845.41	42

2.2. The value of fuel stock generally held is insignificant compared to its annual consumption. The figures of inventory balances have, therefore, been shown without fuel in the above Table to have a clear appreciation of the turnover of the balances to the total issues.

† The Railways purchased stores valuing Rs. 1,747 crores in 1981-82. A broad analysis of the purchases made is :

(Rupees in crores)	
Stores for operation, repairs and maintenance	705
Stores for construction	86
Fuel	523
Complete units of rolling stock and materials for manufacture of rolling stock.	433
<b>Total</b>	<b>1,747</b>

\* The subject is being dealt with in two exclusive chapters in our forthcoming Report on Materials Management.

† The exclude the balances under :

(i) Workshop manufacturing suspense. This represents the work in progress in various workshops and production units.

(ii) Miscellaneous Advance. This represents the value of stores given as free supply items to fabricators/sub-contractors.



2.3. The inventory control cells, which were established on the Zonal Railways in January 1973, initially worked with considerable enthusiasm and dedication and considerably brought down the inventory balances; the inventory to issue ratio which was as high as 84 per cent in 1968-69 was brought down to 33 per cent in 1978-79.

2.4. Thereafter the inventory to issue ratio started deteriorating; the inventory to issue ratio rose to 42 per cent in 1981-82. This was because an impression gained ground, quite unjustifiably, that the inventory control measure were rather harsh and resulted in non-supply of material in time. The control over procurement was relaxed and purchases made without regard to the availability of funds and without bothering about the inventories building up. The inventory control suffered a serious setback and the officers manning the inventory cells began to be increasingly utilised for procurement work for which they were not intended. Sufficient time not being made available on the computers, general apathy in regard to modernisation of stores depots, organisational deficiencies and inadequate application of modern concepts like Market Research and value analysis were other contributory factors.

2.5. We recommend that the inventory control cells should be reactivated and wherever necessary strengthened.\* The officers manning these cells should not be used for procurement work but should be in a position to devote their full and undivided attention to inventory control functions. These cells must carry out the duties originally assigned to them and their performance monitored closely.

### 3.0. Inventory to issue ratio-Index of inventory efficiency.

3.1. The ratio of the inventory balance as at the end of the year to the total issues made during the year is treated by the Railways as an index of inventory management efficiency, the lower the ratio, higher is considered the inventory efficiency. The emphasis is to keep the physical balances as low as possible at the end of the financial year so that the capital-at-charge on which Railways have to pay dividend† to the General Revenues is kept at the minimum.

3.2. The Committee would like to caution that such a turnover ratio which is based on the stores balance on the last day of the financial year is bound to give a misleading picture of inventory efficiency. It is possible to manipulate and easily achieve quite a low figure of inventory on a particular date which is not required to be sustained throughout the year. The risk in using a norm of this kind is that the organisation, with a view to project a better image though illusory, takes unethical steps, to bring down the inventory as on 31st March of the year.

3.3. We are told that some of the steps which are taken in this regard are :-

1. Suppliers are asked to postpone deliveries to beyond 31st March.
2. The user departments are encouraged to submit requisitions for larger amounts of material or for materials not needed.

3. Purchase orders are delayed or not placed at all unless the user is willing to accept the material directly under Revenue, creating shortages of materials in the Inventory.

3.4. Table 8.2 shows how the inventory balances have varied on the Western Railway during the course of the financial year.

Table 8.2  
Inventory balances-Variations

Date	Inventory balances (Rupees in crores)
30 June, 1982	37.89
30 September, 1982	43.15
31 December, 1982	41.04
31st March, 1983	28.63
Average	37.68

3.5. Thus on Western Railway, the physical inventory on 31 March, 1983 was nearly 34 per cent less than the highest level of inventory during the year. Such a norm serves no purpose other than creating a wrong picture of inventory and causing harm to the system, many administrative problems are caused when large amounts of material begin flowing in April and May of the next year which cannot be speedily cleared and accounted for. The need to develop a suitable scientific norm for inventory control is paramount.

3.6. We recommend that for the purpose of working out the inventory to issue ratio, while the issues for the entire year should be taken into account, the inventory balance to be taken should not be that on a particular date, but an average figure. Ideally, the Railways should first work out the average inventory for each month by taking the mean of the maximum and minimum stores balances in each month. The overall average for the entire year can then be computed by adding these monthly averages and dividing the figure arrived at by 12. This may, however, not be immediately possible with the present limitations of the computer system. We, therefore, recommend that for the time being, it would suffice if the inventory balance is taken as the average of the stores balance at the end of each quarter during the year. We must also emphasize that the Railways should not misdirect their efforts to now artificially bring down the balances at the end of each quarter, instead they should strive hard and put their inventory management functions on a sound base.

### 4.0. Inventory carrying cost-saving.

4.1. In our later Report on Materials Management, we would be recommending review of a 'A'‡ item on a three months' basis, 'B'‡ items on a six months' basis and 'C'‡ items on an annual basis. We have also recommended certain safety stocks§ for these categories. If our recommendation is accepted and implemented, it would be possible for the Railways to achieve an inventory to issue ratio of about 30 per cent.¶ We consider that this is not an over optimistic target to be aimed at.

\* Fuller treatment of the subject would appear in our Report on Materials Management.

† 1. For capital invested upto 31 March, 1980, rate of dividend is 6 per cent.

2. For capital invested after 31 March, 1980, rate of dividend is 6.5 per cent.

‡ account for 85 per cent of total consumption; 'B' per cent and 'C' items 5 per cent.

Source : Controller of Stores, Western Railway.  
§ One month for 'A' items, 2 months for 'B' items and 3 months for 'C' items.

¶ Inventory of 'A' items—1.5 (With 3 months review period this would be the average stock held in terms of monthly consumption)+1 (Safety stock)=2.5 months' consumption.  
Inventory of 'B' items 3+2=5 months consumption  
Inventory of 'C' items 6+3=9 months consumption  
Total Inventory = 0.85×2.5+0.10×5+0.05×9 = 3.07 months consumption.  
say 30% of the annual issues.



4.2. The inventory to issue ratio for 1981-82 for the Railways as a whole is 42 per cent. But if this turnover ratio is calculated on the basis of the average of the inventory balances existing at the end of each quarter during the year, it would work out to about 55 per cent\*, provided the variations noticed in the quarterly Stores balances on the Western Railway can be used to project the ratio for all the Railways. If, therefore, our recommendations are implemented, the inventory balance should be reduced by over 200 crores. @

4.3. The inventory has a certain amount of cost associated with it by way of interest on the capital blocked, cost of storage, security arrangements losses due to deterioration in stock, obsolescence, theft, pilferage, fire, etc. In the absence of full data, it is not possible for us to arrive at the inventory carrying cost on the Railways. Usually this cost is taken as 30 per cent† of the value of the inventory. A major component of this cost is the interest on Capital which depends on the fiscal policies of the Government. If we reduce this portion of the cost because the prevalent rate of dividend payable by the Railways is only 6.5 per cent, the inventory carrying cost should be of the order of 20 percent.

4.4. Thus the monetary benefit which the Railways would get if they are able to keep their inventories at 30 per cent of the issues would be of over Rs. 40 crores§ per annum.

#### 5.0. Quality of spares/components.

5.1. We are told that for a number of items, the quality of spare parts being procured indigenously does not measure up to international standards. Because of the comparatively inferior quality of these components, the frequency of repair and overhaul, as prescribed by the Railways is higher than what is indicated in the maintenance manuals received from the suppliers abroad or initially specified by the RDSO.

5.2. We have made representative study of a large number of important associated items, which go to reflect a definite pattern. It would be appropriate to illustrate the point by citing certain vital instances from a representative area, viz diesel locomotive maintenance.

5.3. We find that on the diesel side the traction motors and expressor seals have been causing lot of distress and maintenance problems. These items have been repeatedly discussed in the meetings of Diesel Maintenance Group and have always come in for severe criticism

about their performance and reliability. We have also picked up the item of roller bearings which require more frequent maintenance attention as compared to the position existing on railway systems abroad. We will briefly discuss these items in the subsequent paragraph.

#### 6.0. Traction Motors.

6.1. The frequency of overhauls for traction motors supplied by Bharat Heavy Electricals Limited (BHEL) is two years as against the overhaul period of three years in respect of the imported General Electric (GE) motors.

6.2. We are told that some of the factors contributing to adoption of earlier maintenance schedules of BHEL motors as against GE motors are :—

1. Unsatisfactory performance of indigenous bearings.
2. Slackening of commutator bolts on new traction motors.
3. Cadmium compound ingress on BHEL traction motors.

6.3. The Railways have also reported a large number of cases of solder run-outs on BHEL traction motors. The solder run-out cases on GE motors are, however, practically non-existent. We find that to overcome this problem, the issue has been discussed with BHEL during review meetings and that BHEL had undertaken to introduce TIG‡ welding for the manufacture of these motors. This does not seem to have, however, been taken up on a large scale.

6.4. It is difficult to accept that BHEL, a premier public sector undertaking, with extensive tie-ups abroad, could not develop the necessary wherewithal to provide motors of the same standard which the foreign companies were making more than a decade ago.

#### 7.0. Expressor Unit.

7.1. The diesel locomotives expressor is being overhauled annually whereas the frequency of overhaul was once in three years when the original expressors were received from abroad.

7.2. We are told that this is because the indigenously procured seals do not give trouble free service for more than one year.

* 1. Inventory on Western Railway as on 31 March, 1982.	Rs. 28.63 crores
2. Average inventory on Western Railway.	Rs. 37.68 crores
3. Inventory to issue ratio for the Indian Railways for 1981-82 (Cf. Table 8.1)	42 per cent
4. Increase in inventory to issue ratio if average inventory is taken as the base $42 \times 37.68$	55 per cent
$= \frac{28.63}{100}$	

① 1. Issues during 1981-82	Rs. 846.41 crores
2. Existing average inventory balance with 55 per cent turn-over ratio $846.41 \times 55$	Rs. 465.5 crores
$= \frac{846.41 \times 55}{100}$ (as distinct from the inventory balance as at the end of the year).	

3. Inventory balance if our recommendation to achieve inventory to issue ratio of 30 per cent is accepted	Rs. 253.9 crores
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$$= \frac{846.41 \times 30}{100}$$

Difference (.2) (.3). Rs. 211.6 crores

† According to Prof. P. Gopalakrishnan of the Administrative Staff College, Hyderabad, and Prof. M. Sundaresan of Columbia University, USA the inventory carrying cost in a typical Indian industry is about 30 per cent. Their treatise, 'Materials Management : An integrated approach, lately published by Prentice Hall of India, New Delhi (1982), provides interesting and relevant information.

§ 20 per cent of Rs. 211 crores = Rs. 42.2 crores.

‡ Tungston Inert Gas.



### 8.0. Roller Bearings.

8.1. We have already mentioned\* that many railway systems abroad do not give any maintenance attention to bearings up to a period of 6 to 7 years. But on the Indian Railways these are being opened up in sicklines on every two years (in between two successive periodical overhauls) for examination and regreasing. The situation has become so serious that a shock pulse tester has been introduced to aid maintenance staff in timely detection of the unfit bearings.

8.2. There is no clear evidence available before us to know whether the poor performance of the indigenous roller bearings is due to bad quality or improper specifications or both. The fact, however, remains that experience shows that the performance of such bearings does not compare with well-known international makes.

8.3. We recommend that this matter should be probed in detail. No compromise should be made by the Railways on the quality of equipment. If necessary, they should make suitable changes in design and specifications, so that, as in the case of advanced railway systems abroad, they do not have to give any maintenance attention to this item in between workshop-based periodical overhauls.

### 9.0. Consequences.

9.1. The increase in frequency of repairs/maintenance schedules of a large number of items has a deleterious effect on the working of the system.

9.2. The Railways have to pay heavy penalties by way of :—

1. Increased consumption of material required to keep the fleet in good fettle.
2. Increase in the ineffective percentage of the rolling stock resulting in loss of revenue earning capacity.
3. Higher manpower inputs required in workshops and sheds to maintain assets.

9.3. All these add up to a sizeable recurring financial burden.

### 10.0. Tiding over the problem.

10.1. True, it is in the national interest to use as many items of indigenous manufacture as possible to encourage the Indian Industry. At the same time, however, it should be appreciated that the Railways can not continue to live with inferior performance. The poor performance of material supplied eats away into the operational and financial efficiency of the Railways. The time has, therefore, come for fresh thinking.

10.2. We recommend that for certain high value and critical components for which the performance of indigenous supply is not of international standard, the Railways should go in for imports till the local industry is able to manufacture products of the requisite standard and quality.

10.3. While purchasing these items from the world market, the Railways would no doubt conduct a cost

benefit analysis of the two alternatives viz. whether to continue with the indigenous items with a lower life or to go in for imports. In working out the cost of using sub-standard indigenous material, not only the direct cost of the material should be reckoned, but also the financial effect of increase in the percentage of ineffectiveness in the rolling stock and the larger number of men required for maintenance.

10.4. Such imports however cannot be continued in perpetuity. The indigenous producers would, in consultation with the Railway, undertake uprating and quality control, inducing improvements in specifications, so that use of indigenous material can be resumed. The Railway should in this regard render whole-hearted assistance to the local producers to bring the product to the desired quality and specifications. If despite this, the indigenous component does not come up to the standard, collaboration with the relevant industry abroad should be sought.

### 11.0. Consumption control.

11.1. The Railways, which incur over 40 per cent of their expenditure on stores, do not have any worth while machinery to economise on the consumption of materials. The impression that we have gained during our numerous visits to work shops, production units and zonal railways is that not much attention is paid to the quality control of materials. Several railway officials, when spoken to mentioned that quality of 'bought out' items is definitely bad and is a source of corrupt practices.

11.2. To us it appears that the real problems on the Railways are in the following areas :—

1. Obsolete and inadequate designs and specifications.
2. Dilution of quality standards by the firms
3. Laxity in quality control in railway workshops and production units.†
4. Inadequate testing methods by the testing agencies which render it impossible to detect the dilution of quality mentioned at (2) above.
5. Lack of effort by the Railways to help the public and private sectors to improve quality to the requisite standard.‡

11.3. In a frank awareness of these areas of weakness, the Railways should lay stress on quality assurance and make whole hearted and positive efforts to improve quality.\*\*

11.4. It would be worthwhile to review the specifications and testing procedures of all high value and critical items. The testing procedures should be revised wherever necessary to cover areas of frequent failures. For instance, in the case of traction motors, there were a large number of solder runouts. Our testing procedure for such items should include the test for the quality of the solders.

11.5. The annual requirement of stores are today based on the past consumption trends, without in any way correlating them with the lives of the components purchased as they should be.

\* Para 19.5, of Chapter III of Part V of our Report on Production and Maintenance of Rolling Stock.

† Cf. para 5.9 of Chapter V of Part V of our Report on

Production and Maintenance of Rolling Stock.

‡ Cf. Para 9 of Chapter IV of Part V of our Report.

\*\* Also Cf. Chapter V of Part V of our Report.



11.6. The Railways should forthwith evolve a suitable control mechanism whereby the actual consumption of high value and critical items during the course of the year is regularly compared with the consumption computed on the basis of their specifications.

11.7. For this purpose, it would first be necessary to lay down the lives of the items by conducting field trials. We recommend that this should be commenced forthwith. Should the variation between the actual consumption and that based on the prescribed life be abnormal, detailed investigations would be indicated to know whether the excessive consumption is due to acceptance of poor quality of material or other causes.

11.8. The ultimate aim should be that the lives of the items procured indigenously should be comparable to international standards and that the actual consumption of material is based on such lives.

#### 12.0. Monopoly suppliers.

12.1. The procurement of high-quality material at economical rates assumes greater significance where there is only one established indigenous manufacturer. In such cases it is essential to ensure that the price quoted by the firm is not unreasonable.

12.2. We would in this regard like to bring out that the Public Accounts Committee (1980-81) had severely criticised the purchase of axle bearings from National Engineering Industries Ltd. (NEI).

They stated : "The Committee cannot but conclude that M/s. NEI have exploited their position of a monopoly indigenous supplier and have derived maximum benefit at the cost of Railways. The Committee cannot but express their displeasure on the undue indulgence shown to this firm all along. They recommend that the whole matter may be enquired into by the Cost Accounts Organisation of the Ministry of Finance to determine what should have been the reasonable price legitimately payable for the products of this monopoly supplier after taking into account the break-up of labour and material contents of the cost of production of the manufacturer. If the enquiry reveals that the prices paid to the manufacturer were not reasonable and the manufacturer had derived undue benefit, responsibility therefor, should be fixed on the officers concerned".

12.3. We have been advised that the matter is being enquired into by the Cost Accounts Organisation of the Ministry of Finance and their report is awaited.

12.4. We recommend that the Railway Board and Zonal Railways should identify similar other items and even where procurement is to be made indigenously because capacity in the country is available, they should periodically obtain quotations from abroad for testing the market. A comparison should then be made of the cost and the life of the component indigenously available with that available in the foreign market. By introducing such a system, the Railways would be able to negotiate on surer grounds with the monopoly suppliers and would be able to fully satisfy themselves that they are not paying unduly high rates to the indigenous manufacturers. Also where there is only one source of supply, they should develop other sources to bring into play the natural forces of competition.

#### 13.0. Other areas of economy.

13.1. In materials management, we cannot ignore a few other vital areas where economy is both possible and necessary.

#### 14.0. UTS of rails with higher Ultimate Tensile Strength

14.1. The Railways incur considerable expenditure on rails needed for track renewals and new constructions.

14.2. We have in this regard already pointed out\* that most of the railway systems of the world have switched over to rails with UTS of 90 Kgs. per sq. mm but the indigenous production of rails still continue to be of a lower UTS of 72 Kgs. per sq. mm.

14.3. The Government should prevail upon the steel plants in the country to switch over to the production of rails with UTS of 90 Kgs. per sq. mm in place of the medium manganese rails which have a low UTS of 72 Kgs. per sq. mm. With a longer service life of about 40 per cent and not much higher price, this change-over will be very cost effective for the railway system.

#### 15.0. Value analysis.

15.1. At the time the inventory control cells were established on the Zonal Railways, it was envisaged that modern concepts like value analysis would be increasingly applied to identify and design cheaper substitutes with equal or better useful life. The objective of this technique is 'equivalent performance at a lower cost'. In this analysis the functional performance of the items remain unaffected, the emphasis gets shifted from performance-oriented thinking to value-oriented thinking. The use of aluminium wires for transmission of electricity instead of copper wires is an example of the use of this technique.

15.2. We recommend that the Railways should increasingly apply this technique with a view to bring down the cost of material used.

#### 16.0. General.

16.1. By improving the designs and specifications, accepting material of proper quality and by extensively using the value analysis approach, the Railways, we hope, would be able to make a big dent not only in the direct cost of stores but also in improving the utilisation of rolling stock and by reduction in the manpower inputs due to reduced maintenance efforts. It is, however, difficult to quantify the benefit in precise monetary terms at this stage.

#### 17.0. Conclusions.

17.1. The inventory control cells should be reactivated. The officers manning these cells should not be assigned any other work, but allowed to devote their full attention to the inventory control functions.

17.2. The inventory-to-issue ratio based on the position of inventory existing on 31 March every year is not a reliable index to judge inventory performance. The risk in using this as a norm for judging the performance of the organisation is that unethical steps are taken to bring down the inventory on 31 March of the year.

† This is anticipated to be about Rs. 125 crores in 1983-84.

\* Para 6.3, Chapter I of Part III of our Report on Railway Track, Bridges and Land.



While the ultimate aim should be to work out the inventory balance for every month and then strike an average, till the management is able to overcome present restraints as regards the use of the computer, it would suffice if the inventory balance is taken as the average of stores balance at the end of each quarter during the year.

17.3. The aim of the Railways should be to achieve an inventory -to-issue ratio of 30 per cent and if they are able to do that, saving of more than Rs. 40 crores per annum may be expected through reduction in inventory carrying cost.

17.4. In regard to the high value and critical items for which the performance of indigenous supply is not of international standard, the Railways should go in for imports.

17.5. Such imports cannot, however, be continued in perpetuity. The indigenous producers should undertake uprating and quality control so that indigenous production could be resumed. The Railways should in this regard render purposeful assistance to the local producers to bring the product to the desired quality and specifications. If despite this, the indigenous component

does not come up to the standard, collaboration with the relevant industry abroad should be sought.

17.6. The Railways should be quality-conscious and ensure that the items bought or manufactured strictly conform to specifications.

17.7. The lives of high-value items should be fixed by field trials and quantities actually consumed compared with those computed on the basis of the lives of these items. For abnormal variations, detailed investigation would be called for. The ultimate aim should be to attain international standards of quality and specifications so that lives of the locally manufactured item are comparable to those of the imported components.

17.8. Where there is only one single established supplier, the Railways should periodically compare the life and cost of the component available in the foreign market *vis-a-vis* the indigenous supply to ensure that, unduly high rates are not being paid to the supplier. For such items, the Railways should also develop more sources of supply for competitive rates.

17.9. The Railways should increasingly use the value analysis technique, the objective, of which is equivalent performance at a lower cost.





## CHAPTER IX

### SUMMARY OF RECOMMENDATIONS

#### Chapter I

##### Overview

1. The intrinsic inefficiencies of the system should not be passed on to the rail users in the form of higher fares and freight. The non-essential expenditure should be ruthlessly eliminated and operational constraints systematically removed. (Para 1)

2. The working expenses should, for the purpose of computing the operating ratio, include payment of dividend and Appropriations to the Pension and the Depreciation Reserve Funds at the levels suggested in Part IV of the committee's Report on the 'Railway Reserve Funds'. (Para 3.6)

3. Management should not defend weaknesses of the system, but in frank acceptance of failures and inadequacies should make vigorous and sustained efforts to revamp the organisation (Para 12)

#### Chapter II

##### Uneconomic Branch Lines

4. Out of a total of 136 40 uneconomic branch lines as identified by us may be closed down. (Para 16)

5. The Railways should enter into serious dialogue with the State Governments who should either agree to the closure of these 40 lines or to share the loss on a 50:50 basis in respect of those lines which for their own reasons they propose to keep alive. (Paras 16.2 to 16.4)

6. (i) In respect of the lines not closed (Out of the 40 lines), the Railways should set off 50 per cent of the losses against the share of the grant payable to the States in lieu of the passenger fare tax.

(ii) This adjustment should commence after two years, the time limit for completion of the State-Railway dialogue. This recommendation should also be placed before the current Finance Commission by the Railways. (Para 16.8)

7. The branch lines on which train services have been discontinued should be dismantled. (Para 16.10)

8. (i) 'Katcha' roads in the areas served by 17 uneconomic branch lines (listed) should be converted into 'all-weather' metalled roads, and bus services augmented within five years by the State Governments.

(ii) Meanwhile, the Railways should gradually reduce rail services on these lines, ensuring that at least one pair of trains is run till the road services fully take over. (Paras 17.1 to 17.4)

9. (i) Out of 136 uneconomic branch lines, the continuance of 74 uneconomic branch lines is necessary from the point of view of strategic, pilgrimage or tourist importance or from the development angle.

(ii) The losses on these lines should continue to be borne by the Railways, and efforts made for gradually narrowing down the losses.

(Para 19.1 to 19.3)

10. A specially created survey team on South Eastern Railway should conduct a techno economic study of the Satpura Railway. The study should be completed in six months and specific decisions taken thereon by the Railway Board within the next six months, so that the entire exercise is completed within twelve calendar months. (Paras 20.5 to 20.9)

11. Techno-economic studies should also be carried out in respect of those branch lines (other than the 40 lines recommended for closure) on each of which the accrual of loss exceeds Rs. 20 lakhs annually. The findings of these survey teams should be forwarded to other Railways for application to the uneconomic branch lines in their jurisdiction. (Paras 20.8 and 20.9)

12. Periodic meetings with State Governments should be institutionalised where matters of common interest including closure of uneconomic branch lines should be discussed (Paras 21.2 and 21.3)

13. A triennial review should be conducted to identify uneconomic lines which ought to be closed down. (Para 22.1)

14. The siding from Jogbani to Birpur constructed for Kosi Project should be dismantled and the released material disposed of or used elsewhere. The Railways should investigate if there are any other similar sidings lying unused and those should be dismantled. (Para 23)

#### Chapter III

##### Economy on Steam Traction

15. Fuel economy needs serious attention at the highest level not only to bring down working expenses, but also as a measure to serve a national cause. (Para 1.9)

16. The inspection organisation under the Chief Mining Adviser, Dhanbad should be energised. (Para 4.5)

17. The Railways and the Coal India Limited should jointly pursue with Indian Statistical Institute and Indian Standards Institution for evolving a bulk sampling plan, so that results of the sampling checks could be applied to the entire supply by the colliery. Till then, adequate transport facilities should be provided to the inspectorial staff to improve their mobility enabling them to draw larger number of samples. (Para 5.13)

18. The collieries which are habitually supplying a very high percentage of sub-grade coal should be downgraded and alternative collieries selected. (Paras 6.1 and 6.2)



19. Major loading points should be provided with electronic weigh bridges. The grant of rebate to Coal India Limited which have plans to instal such weigh bridges should be expeditiously considered.

(Paras 7.7 and 7.8)

20. On some Railways transit losses have far exceeded the 1.5 per cent target. This needs urgent attention so that the losses are plugged.

(Para 7.10)

21. The theft of coal appears to be an organised crime. Special squads comprising fuel inspectors, RPF and GRP under the control of Chief Security Officer and Additional Chief Mechanical Engineer (Fuel) should be formed. The squads should organise frequent raids, identify notorious sections and undertake spot verification of coal. Prosecution against persons involved should be launched speedily.

(Paras 7.16 and 7.17)

22. There is paramount need to improve the quality of repairs and maintenance of steam locomotives which presently is altogether unsatisfactory, resulting in higher incidence of failures. The Railways should also eliminate incidence of damaged or absent brick arch fittings.

(Para 10)

23. The fire grate area of higher hauling power steam locomotives deployed on van and shunting services should be reduced.

(Paras 10.5 and 10.6)

24. Where recruitment for Steam Locomotives is unavoidable, future recruits should meet the educational and skill standards specified for diesel traction.

(Para 11.2)

25. (i) Trip rations should be properly fixed on a time bound programme and test-checked by senior officials. A monitoring system should be devised to watch the progress of implementation at the zonal level.

(ii) The divisional strength of fuel inspectors should be augmented and some inspectors exclusively earmarked for fixation of trip rations.

(iii) At least one Assistant Mechanical Engineer or Divisional Mechanical Engineer should be able to pay exclusive attention to economy in coal consumption in a division.

(Paras 12.3 to 12.8)

26. The running of trains on steam traction should be rationalised to reduce heavy detentions which are today taking place in loco sheds, on the run, and in terminal yards.

(Paras 13.6 to 13.7)

27. The rationalisation on work train pilots, van and shunting goods trains conducted on Delhi Division in the late Seventies under 'Operation Kilometrage' should be seriously adopted as a strategy of performance on the principal operating Divisions.

(Para 13.14)

28. Excess number of steam locomotives should be withdrawn from line and condemned. There should be no hesitation in the condemnation of steam locos even if they have not lived their entire codal life. The possibility of selling them to industrial and mining organisations should also be explored.

(Para 14.6)

29. The procedure for advanced condemnation should be reviewed and made simpler.

(Para 14.7)

30. Targets of coal consumption should be laid down service-wise and shed-wise, having regard to the

phasing-out plan of steam locomotives and the traffic they will be called to handle.

(Para 15.2)

31. (i) Fuel economy on steam traction should continue to be pursued seriously as the annual coal bill of the Railways is still over Rs. 200 crores.

(ii) Earnest efforts should be made to halt the galloping increase in the rate of consumption of coal per thousand gross tonne kilometres, particularly on the Broad Gauge.

(iii) Implementation of the above recommendations which have the potential of yielding an annual saving of about Rs. 38 crores should be examined and vigorously pursued.

(Paras 8.3 and 16)

## Chapter IV

### Economy on Diesel Traction

32. The permissible limit of transit and handling losses should be reduced from 0.2 per cent to 0.1 per cent of the receipts. Wherever the losses exceed this limit, shed-wise investigation would be warranted.

(Para 2.5)

33. The scope of taking supplies of HSD oil through pipelines instead of by tank wagons should be examined. It would be desirable to involve the Indian Oil Corporation in keeping a constant surveillance on the storage tanks.

(Para 3)

34. Specific train resistance being much less for loaded freight trains as compared to empty trains, the incidence of empty running should be systematically reduced.

(Para 5)

35. Whenever a train is likely to be detained for more than one hour, a message should be passed on to the engine driver for switching off the engine. The incidence of weak batteries should be minimised and drivers suitably trained so that they are able to promptly restart the engine.

(Para 6)

36. As a matter of policy, out of course halts and stoppages should be avoided.

(Para 7.3)

Visibility of signals should be improved so that drivers do not have to unnecessarily restrict the speed of their trains and consume excess fuel.

(Para 8)

38. Temporary fueling installations should be converted into permanent fueling depots and the incidences of tank-to-loco fueling eliminated.

(Para 9)

39. The closure of small and intermediate yards and scaling down of short distance passenger trains should be seriously pursued to bring about substantial fuel economy.

(Para 10)

40. Proper attention should be paid to improve the quality of maintenance of diesel locos which are increasingly failing. Worn-out parts, like piston rings, gaskets, fuel injection nozzles etc., should be replaced in time to avoid excessive consumption of fuel.

(Para 11.9)



41. Acceleration control devices should be kept in proper working order and not disconnected from the circuit. (Paras 12.2 and 12.3)

42. Urgent action should be taken to improve the quality of track maintenance. (Para 13)

43. Speed restrictions, which reduce the usage of rolling stock and increase wasteful consumption of fuel, should be reduced to the extent possible. (Paras 13.3)

44. (i) A scientific study should be carried out by RDSO to lay down the guidelines for imposition of speed restrictions.

(ii) Existing system should also be reviewed to ensure that caution orders already lifted do not continue to be issued. (Paras 13.3 to 13.6)

45. Pace of continuous welding of track should be accelerated to achieve saving in consumption of fuel. (Paras 13.7 to 13.10)

46. Higher poundage of rails should also be used to realise a saving in fuel consumption. (Paras 13.11 and 13.12)

47. (i) A global survey of the family of fuel efficient engines should be carried out and necessary changes in the design and specification of the components made to improve the fuel efficiency of the engine.

(ii) Should it be necessary, the latest technology should be imported. (Paras 14.7 and 14.8)

48. The recommendations made by the Petroleum Conservation Action Group should be subjected to extensive studies and trials to explore areas of possible fuel economy. (Para 14.11)

49. Weight of the Vehicles should be reduced to optimise oil consumption. Maximum reduction in weight is possible by changing the existing oxichloride flooring to 'vinyatile floors. This should be pursued on a high priority. (Paras 14.12 to 14.14)

50. An early decision about the marked carrying capacity of BOX N wagon should be taken as its introduction in the system is likely to result in less fuel consumption. Their design inadequacies should be removed. (Paras 14.15 and 14.16)

51. Norms and guidelines regarding shed consumption of HSD oil should be laid down. (Para 15.3 and 15.4)

52. The issue of lube oil from small unsupervised points leads to leakages and misuse, and should be stopped. Lube oil should be issued only from sheds. (Paras 15.11)

53. Lube oil dipstick on the locomotives should be calibrated to show exact readings instead of giving indications of only high and low marks. (Para 15.12)

54. Tests to determine lube oil consumption should be undertaken on about 10 per cent of the diesel engines. Lube oil consumption being much higher than the designer's anticipation, a need for additional research and development effort is indicated. (Paras 15.13 and 15.14)

55. A study should be undertaken about the design, layout and the configuration of the engine pipelines and steps taken to avoid lube oil being pilfered through the pipe joints. (Para 16.2)

56. Number of installations from where HSD oil is issued should be minimised and such locations manned by Assistant Mechanical Engineers. (Para 16.3)

57. (i) Test bed facilities in the production Units and RDSO should be modernised.

(ii) Adequate test bed facilities should also be developed in the POH shops and in course of time in the locomotive sheds. (Para 17)

58. The present set-up of fuel control organisation needs to be strengthened in the way recommended. (Para 19.3)

59. Trip rations should be fixed for each train and each section scientifically, test-checked by mechanical engineers and supported by theoretical formulae. (Para 20)

60. A suitable flow meter should be devised and fixed at an appropriate place in the diesel loco to indicate the fuel oil consumed during the trip. (Para 20.4)

61. (i) Variations between the actual use of oil vis-a-vis the norms fixed should be analysed in detail and corrective strategies adopted for cutting down fuel consumption.

(ii) This aspect of work should be monitored by the top echelons of management including the General Manager. (Para 20.5)

62. A fuel consumption analysis should be made in the sheds, locomotive-wise, driver-wise and section-wise. (Para 20.6)

63. Fuel Cells in the sheds should select a few locomotives and monitor them continuously during service to identify factors adversely affecting the engine performance. (Para 20.7)

64. Compact but effective 'energy conservation cells' should be opened in RDSO to study and compare the performance of locomotives homed at a few sheds selected at random from year to year. (Para 20.8)

65. Statement No. 27 (b) of the Annual Statistical Statements should show figures on the basis of actual consumption and not issues. (Para 21.4)

66. Detailed studies and field investigations should be conducted to determine the reasons for wide and abnormal variations in oil consumption per thousand gross tonne kilometres from year to year. (Para 21.9)

67. (i) The degree of managerial involvement and accountability will have to be raised considerably if any worthwhile economy is to be achieved in consumption of oil over which the Railways are presently spending more than Rs. 350 crores per annum.

(ii) Implementation of the suggestions made should be taken up seriously, pragmatically and objectively, so that the organisation is able to derive a financial benefit of the order of Rs. 75 crores per annum. (Para 22)

## Chapter V

### Economy in the Use of Electricity

68. (i) State Electricity Boards should not charge the Railways at rates higher than those charged by them from other bulk industrial consumers.

(ii) If industrial consumers are entitled to certain rebates, the same should also be offered to the Railways. (Para 2.16)



69. The maximum demand charges should be levied on the basis of the coincident demand of all the sub-stations catered to by a particular grid system.

(Para 2.16)

70. To compensate for additional amount invested by Electricity Boards to ensure extra reliability of supply to the Railways, the maximum demand-charge component of the two-part tariff may have to be marginally higher.

(Para 2.16)

71. State Electricity Boards should be advised of the maximum coincident demand at any time and what roughly would be the percentage amount which they would have to forego if the revised method of computation of maximum demand is brought into force.

(Para 2.16)

72. The integration period for the purpose of computation of maximum demand should not be less than 30 minutes.

(Para 2.17)

73. Exemptions from depositing security money allowed by some state Electricity Boards to other Government institutions should be extended to Railways.

(Para 2.17)

74. (i) As recommended by the Rajadhyaksha Committee on Power, a Bureau of Electricity Costs and Prices should be set up to evolve norms for a sound tariff.

(ii) For the intervening period a comprehensive memorandum on the disputed issues should be prepared by the Ministry of Railways and referred to the committee of Secretaries for an equitable and satisfactory solution.

(Para 2.20)

75. Urgent steps should be taken to improve the power factor by installing shunt capacitors.

(Paras 3.2 to 3.4)

76. Technical problems which arose during the trial energisation of the bank capacitor installed at Manikui sub-station should be overcome within a period of six months.

(Para 3.11)

77. It should be examined whether it would be financially and technically prudent to have the capacitor bank at Manikui with 3,000 KVAR rating while with a capacitor of 1,785 KVAR rating, the power factor can be improved to 0.85.

(Para 3.11)

78. Coasting techniques should be practised as a regular measure to realise a saving of more than 5 per cent in energy consumption.

(Para 5.1)

79. Extensive trials should be undertaken on the sides and diagonals of the 'quadrilateral' and then on other important arterial routes with heavy traffic density to determine the sites where coasting boards should be installed. This aspect of work should be completed within a period of one year.

(Paras 5.3 and 5.4)

80. In the case of new electrification projects, the coasting boards should be erected before the route is energised and operated.

(Para 5.6)

81. The pace of continuous welding of rails and use of heavier rails should be accelerated to bring about substantial saving in consumption of electricity.

(Para 6)

82. (i) Thyristor chopper control equipment for D.C. traction should be introduced on the suburban system of Bombay metropolis on a high priority.

(ii) Choppers should also be used on the motor coaches to be deployed on the Calcutta underground railway.

(Para 8.11)

83. (i) The change over of technology from resistance control to thyristor control should be completed within 2 years.

(ii) Since the indigenous development of this item will take time, in the interim period the equipment should be imported.

(Para 8.11)

84. The thyristor control system on A.C. traction should be developed with promptitude, say within a year or two and given urgent and extensive trials by RDSO in collaboration with Eastern and South Eastern Railways.

(Para 9.3)

85. The merits and demerits of thyristor equipment for A.C. traction should be evaluated and a firm decision taken whether the equipment should incorporate the regenerative feature.

(Para 9.3)

86. The effect of harmonics generated by the thyristor equipment on signalling and telecommunication circuits should be studied, and if necessary, the circuits modified.

(Para 9.4)

87. (i) To overcome the problem of voltage drop in the Overhead Equipment due to growth of traffic and running of heavier freight trains, a techno-economic study of the series capacitors should be conducted by RDSO.

(ii) Based on the results of the theoretical evaluations, field experiments should be tried out on high priority.

(Para 10.7)

88. Extensive field studies should be carried out by RDSO, jointly with Zonal Railways and norms of specific energy consumption laid down for goods traffic.

(Para 12.9)

89. Wherever electricity actually consumed on electric traction varies widely from the consumption computed as per the norms, detailed analysis should be undertaken to isolate routes and sections of chronic detention and out-of-course stoppages, etc., so as to adopt vigorous and appropriate remedial measures.

(Para 12.10)

90. A test check of locomotives should be made by installing meters on them to ascertain if the motive power unit is functioning efficiently.

(Para 12.11)

91. As part of the modernisation scheme, machine tools and equipment of obsolete designs should be replaced by equipment with low specific energy consumption.

(Paras 14.2 to 14.4)

92. A monthly quota of electricity consumption in respect of major stations and service buildings should be fixed and the actual consumption compared with this quota. Any abnormal variation should be investigated in detail and such fluctuations remedied by urgent appropriate measures.

(Paras 15.3 and 15.4)

93. Officials, who over a period bring about significant savings in the consumption of electricity, should be given some recognition. The system of giving recognition should be extended to economics in other spheres as well.

(Para 15.4)



94. Energy consciousness should be developed amongst the staff to avoid wastage of electricity by switching off the fans and lights whenever not required. (Para 15.5)

95. As in the case of steam and diesel tractions, a full-fledged fuel economy organisation should be set up also for electricity. (Para 16)

96. The implementation of the suggestions made above should be seriously commenced and completed within time-frames specified. The financial benefit which the system can derive from the different devices and procedures recommended is of the order of Rs. 40 crores per annum. (Para 17)

## Chapter VI

### Economy in Staff Expenditure : Productivity

97. For Productivity of staff which has been on a steady decline and perceptibly low as compared to that on the railway systems abroad serious steps should be taken to raise it. (Para 2)

98. (i) Urgent and objective steps should be taken to upgrade technology, improve operating and maintenance practices and adopt modern management techniques.

(ii) The Railways should take to such a strategy to enable the organisation to handle the anticipated growth in rail-borne traffic by much-less-than proportionate rises in both staff strength and rolling stock. (Paras 2 and 3)

99. With uprating and updating of technology and integrating modern management techniques into the system, the percentage of unskilled and class IV staff to the total strength of staff should be steadily brought down to about 20 percent. The quality rather than the quantity should be the guiding criterion in the deployment of personnel. (Para 3)

100. The senior officers, instead of having a large number of personal assistants and peons, should be provided with modern facilities like intercoms, dictaphones, etc. An expert group should be set up to examine this in detail and lay down norms for the support organisation of officers at various level to be uniformly applied all over the Railways. (Paras 3.6 and 3.7)

101. The importance of man behind the machine needs to be appreciated. Management should nurture and develop the potential for leadership with proper motivation and efflorescence of morale. (Para 4)

102. The management should develop and display greater ability to get along with the staff; at the same time an attitude of submissiveness to labour unrest should give way to firm and forthright dealings. (Paras 5.3 and 5.4)

103. The concept of developing multi-skills should be given serious consideration. (Paras 7.1 to 7.3)

104. The skilled workers should be provided with light and portable tools and wherever necessary with bicycles and such other convenient means of transport. (Para 7.3)

105. The important and major activities should be identified and analysed to know if some activity or part thereof has become redundant with the passage of time or because of automation, modernisation etc. and whether

any cheaper alternative to perform the same can be introduced. (Para 7.3)

106. (i) There should be a suitable machinery to ensure that specific responsibilities for which staff have been provided are actually carried out.

(ii) If some items of work in particular activity are not necessary, the sanctioned strength of the staff should be curtailed. (Para 7.4)

107. Industrial engineering technique should be applied to all forms of activity, whether it be operations, commercial systems, personnel management or other similar activities. Industrial engineering cells with competent and qualified personnel, should be set up in each department and work under the personal direction and supervision of the respective Head of the Department. The recommendations made by these cells should be forwarded to other Zonal Railways for their consideration and application. (Para 9.0)

## Chapter VII

### Economy in Staff Expenditure : Some Potential Areas

108. A comprehensive and well-considered plan, clearly delineating which steam sheds have to be closed and when, how many of the locomotives homed have to be condemned, how many diesel locomotives have to be supplied as replacements, how the staff rendered surplus should be redeployed, and what alternative use has to be made of the land and facilities available in the sheds, should be laid down clearly and unambiguously and its physical execution monitored. (Para 3.12)

109. The closed steam sheds should not be used for activities which are neither financially nor administratively prudent. Half-baked and purposeless schemes like rehabilitation of tenders at Partapgarh should stop and alternative work for the released staff found. (Para 3.12)

110. The production capacity of the manufacturing units should be fully realised and adequate number of diesel shunters/diesel locos supplied to the zonal railways to expedite closure of the steam sheds. (Para 3.12)

111. A detailed study should be carried out to close down yards (or parts thereof) or to bring down the number of shifts, thereby reducing yard shunting and as a consequence the replacement requirements of steam shunting locos. (Para 3.12)

112. The staff rendered surplus on closure of steam sheds should be suitably trained and redeployed in other activities. There should be no hesitation in absorbing skilled surplus staff in diesel sheds. (Para 3.12)

113. The additional staff required for augmenting maintenance facilities for wagons and coaches should be taken from the surplus staff of steam shed closed down or truncated. (Para 3.12)

114. Manpower ratios should not be artificially adjusted by assigning larger number of staff to the additional lines of production. Clear and unambiguous instructions in this regard should be issued. (Para 4.6)



115. Wherever manpower ratios are high, either the out turn should be raised or the manpower requirements cut down. (Para 4.6)

116. With the Railways taking up modernisation of workshops, the existing norm of manpower ratio of 0.25 per standard unit should be revised down-wards. (Para 4.6)

117. Independent time and motion studies should be carried out to develop scientific norms for manpower ratios for diesel/electric locos. This work should be completed within a period of one year. (Para 4.6)

118. The number of staff rendered surplus as a result of partial closure of yards should not be artificially depressed (as seems to have been the case in Ambala yard) for fear of transfer or dislocation of such employees. (Para 5.6)

119. As in the case of Steam sheds, a corporate plan should be prepared for closing down small and intermediate yards, and its execution in the field monitored. (Para 5.7)

120. (i) Management should not be reluctant to solve the problem of redeployment of surplus staff in a forthright manner.

(ii) The matter should be discussed between the labour unions and the zonal railway managements periodically and the released labour absorbed in installations and places where vacancies exist.

(iii) To the extent possible, the absorption of such staff should be within the same division or zone.

(Paras 3.12 and 5.7)

121. The day-to-day information in control offices should be collected through the use of teleprinters and facsimiles and the staff employed to collect the information surrendered. (Para 6.2)

122. Other similar areas where the use of teleprinters and facsimiles is feasible should be identified and new practices introduced to optimise performance and bring about economy in staff. (Para 6.3)

123. The gang-strength formula recommended by a Special Committee should be revised, as it is based not on extensive field studies but only on a few personal experiences. (Paras 7.12 and 7.13)

124. The existing sanctioned strength of gangmen should not be increased even for decasualisation of labour. (Para 7.13)

125. The casual labour in excess of requirement should be surrendered. The casual labour surrendered should as far as possible be employed on new areas of construction or on track renewal works. (Para 7.13)

126. The existing ban on recruitment on casual labour should continue. (Para 7.13)

127. A work study (as already decided by the Railway Board) should be immediately undertaken by associating an independent organisation such as the National Productivity Council to evolve suitable norms for gang strength. (Para 7.13)

128. Training and redeployment of staff rendered surplus should be coordinated at the level of the zonal railway through operation of a 'surplus Staff Bank' for which we have made some concrete suggestions. (Para 8.2)

129. (i) Staff in the 'Bank' should be retrained according to the pre-set plan and redeployed in other activities as early as possible.

(ii) The operation of this 'Bank' including the training and redeployment should be monitored by a high-level team at the zonal level. (Para 8.3)

130. The system of cadre check should be revived and conducted annually and acted upon. (Para 8.4)

131. The existing sanctioned strength of railwaymen should be frozen for a minimum period of 5 years. (Para 8.6)

132. Management, leaders of the trade unions and political leadership should work in tandem to create a climate conducive to discipline. (Para 10.4)

133. The recommendations made above which have a potential of rendering financial benefit of the order of Rs. 100 crores per annum should be seriously considered for implementation. (Paras 9.2 and 11.17)

## Chapter VIII

### Economy in Stores : Inventory Norms and Quality Control

134. The inventory control cells should be reactivated and their performance monitored closely. (Para 2.5)

135. Inventory-to-issue ratio based on inventory existing on 31 March every year is not a suitable efficiency index. The need to develop a scientific norm for inventory control is paramount. (Paras 3.1 to 3.5)

136. (i) The ultimate objective should be to work out the inventory balance for every month and then strike an average.

(ii) Till, however, the present restraints as regards the use of the computer are overcome, the inventory balance should be taken as the average of stores balance at the end of each quarter during the year. (Para 3.6)



137. The practice of taking unethical steps to bring down inventory balance should cease forthwith.

(Para 3.6)

138. Inventories should be kept at 30 per cent of the issues to derive a financial benefit of the order of Rs. 40 crores per annum by way of reduction in the inventory carrying charges.

(Para 4.4)

139. The poor performance of the indigenous roller bearings should be probed in detail. No compromise should be made on quality and if necessary, design changes made so that the roller bearings do not require any maintenance attention in between workshop-based periodical overhauls.

(Para 8.3)

140. (i) The railways should import high value and critical components for which the performance of indigenous supply is not of international standard.

(ii) Such imports should, however, not be continued in perpetuity. Indigenous producers should undertake uprating and quality control so that indigenous production could be resumed.

(iii) The Railways should in this regard render all help to the local producers to bring the product to the desired quality and specification.

(iv) If despite this, the indigenous component does not come up to the standard, collaboration with the relevant industry abroad should be sought.

(Para 10)

141. Due emphasis should be laid on quality assurance, the items bought or manufactured should strictly conform to specifications.

(Para 11)

142. The specifications and testing procedures of high value and critical items should be reviewed. The testing procedures should cover areas of frequent failures.

(Para 11.4)

143. Lives of high value items should be fixed by conducting field trials and a control mechanism evolved whereby the actual consumption of such items is compared with the consumption computed on the basis of their lives. All abnormal variations noticed should be investigated in detail.

(Paras 11.5 to 11.7)

144. The ultimate aim should be to attain international standards of quality and specifications so that the lives and quality of locally manufactured items are comparable to those of the imported components.

(Para 11.8)

145. In the case of monopoly suppliers, a periodical comparison should be made of the life and cost of the components available in the foreign market vis-a-vis the indigenous supply to ensure that unduly high rates are not paid. For such items, additional indigenous sources of supply should be developed for competitive rates.

(Para 12.4)

146. Urgent steps should be taken to switch over from the medium manganese rails to rails with higher UTS of 90 kg. per sq. mm.

(Para 14.3)

147. Value analysis technique should be increasingly applied.

(Para 15.2)

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Prof. Ravi J. Matthai

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(Chairman)

10th October, 1983





सत्यमेव जयते